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Radium Poisoning
A Review of Present Knowledge*

ROBLEY D. EVANS, PH.D.

National Research Fellow, Physics Department, University of California, Berkeley, Calif.

IN some circles victims of radium poisoning are regarded as curiosities, and the view advanced that careful studies of the cases—particularly such fundamental studies as the distribution of radium in the system—are of secondary importance. This view arises from the fact that most of the reported cases arose from uninformed carelessness in one occupation, luminous watch and instrument dial painting, in which protective measures have now been taken.[1, 2]

The view is untenable, however, for three reasons (1) Careful study of the distribution of radium in victims can contribute to knowledge of bone architecture and to the investigation of analogous heavy-element poisoning cases, such as lead and arsenic. Study of the anemias involved has already led to major contributions by Martland. (2) New cases will continue to appear because some physicians are still experimenting with radium solutions for therapeutic uses; because radium solutions are still peddled by the nostrum vendors, who realize splendid profits therefrom; and because radium "activators" for the treatment of drinking water—some of which are dangerous—are still sold in large numbers to a gullible public. (3) Thus far every case of radium poisoning has been fatal, but there is no *a priori* reason for believing that a satisfactory cure will never be found.

Cases of true radium poisoning arise where the victim has taken radium into the body, by mouth or by injection, in which case a fraction of the radium taken remains permanently in the body, and the radiation which it continually emits produces the effects described as radium poisoning. It must be emphasized that the modern use of radium in the treatment of cancer usually involves an entirely different mode of use of radium, and cannot result in true radium poisoning. Since only the penetrating gamma radiation of a radium product is utilized, the radium never enters the patient's system, and the exposure is of definite, limited duration. Over-doses of gamma rays will produce pernicious anemia and myeloid leukemia as late as 4 years after a massive exposure,[3] but these

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effects are to be regarded as radiation burns rather than as true radium poisoning.

Each of the 40 known radioactive elements has a definite rate of spontaneous disintegration which cannot be altered by invoking extremes of temperature or pressure, or by chemical combination. When an atom of radium explodes it emits an alpha ray, a high-energy, doubly-charged helium nucleus, which will traverse a few hundredths of a millimeter of living matter, and is only brought to rest by expending its energy in ionizing about 100,000 atoms. Gamma rays, similar in nature to X-rays, are also emitted.

The exploding radium atom loses mass, electrical charge, and energy in the emitted alpha and gamma rays. The residue is an atom of radon, a heavy, inert, radioactive gas, which can be observed in the air expired by a victim of radium poisoning.

Half of any given quantity of radon decomposes in 3.8 days, the so-called "half-period." Radon is the principal active agent in the water from radioactive springs and drinking water activators, but its short half-period shows that bottled water will become practically free from radon in about 3 weeks.

Radium, because of its relatively long half-period of 1,600 years, cannot disintegrate rapidly enough to be appreciably reduced in amount during the lifetime of a person. Hence radium, once fixed in the bones of a victim of radium poisoning, holds its deadly alpha ray bombardment of the bone structure and of the blood producing centers at a nearly constant rate.

Radium decomposes into radon. Radon, in turn, decomposes into an element called radium A, and this in turn into radium B, radium C, radium C″, radium D, radium E, and radium F (polonium), which disintegrates into lead, the stable end-product of this decay series. In the gamma ray treatment of cancer, the gamma ray of radium C is principally employed.

Radium is chemically quite similar to barium, hence also to calcium. Efforts to remove radium from the body of a victim of radium poisoning must therefore involve mobilization of the calcium, and must borrow heavily from the body of knowledge which is calcium therapy.

In cases of radium poisoning, at least one other radioactive element is of major importance, because it has been widely used in luminous paint and in radioactive nostrums. It is called mesothorium-1, is a beta ray emitter with a half period of 6.7 years, and, like radium, gives birth to a long chain of radioactive substances, one of them gaseous (thoron), five of them alpha ray emitters, four more beta ray emitters, and has lead as its stable end-product.

As in the case of the radium series, the presence of these radioactive decay products multiplies, in proportion to the number of alpha ray products, the destructive effects which could be produced by radium or mesothorium-1 alone.

The term radium is used in this paper as a convenient abbreviation of the long list of radioactive elements which accompany it, and the effects of mesothorium-1 or of radiothorium are the same.

MODES OF ENTRANCE OF RADIUM INTO THE BODY

It is now possible to distinguish between radium water and "activated" water. The former contains actual radium salts (usually the chloride) which, because of the long half-period of radium may be regarded as permanently radioactive. The radium spring waters, and "activated" waters from emanators and other devices are merely radon water, that is, they contain the short lived radioactive gas radon, which, like all other gases, dissolves in liquids

to a limited extent. These waters go dead in a few weeks unless they are continually reactivated.

A. Numerically, ingestion has been far more important than injection in producing victims of radium poisoning. Public [4] and professional [5] attention has been well focused on the tragic and horrible death of E. M. B. and several of his friends as a result of their drinking the radium water nostrum "Radithor." [4, 5] For the first few months after taking radium into the body there is a sensation of well-being and general physical improvement. Soon, however, the deadly alpha ray bombardment of the blood producing centers begins to be felt, and death follows in a year or more, depending on the total quantity of radium fixed in the system. Protection of the public from these nostrums is mainly a matter of public health education and legislation.

B. Although the greatest number of victims came out of the luminous watch dial industry, this source has been quite well stopped by the introduction of machinery and of protective measures where hand work is still necessary. From the war period until the end of 1924 an average of some 350 persons, mostly women, were employed in hand painting luminous numerals and hands on watches, clocks, airplane instruments, etc. Due to labor turnover probably about 800 people worked long enough to endanger their lives. In painting the numerals on a fine watch, for example, an effort to duplicate the shaded script numeral of a professional penman was made. The 2, 3, 6 and 8 were hardest to make correctly, for the fine lines which contrast with the heavy strokes in these numerals were usually too broad, even with the use of the finest, clipped brushes. To rectify these too broad parts, the brush was cleaned and then drawn along the line like an eraser to remove the excess paint. For wiping and tipping the brush the workers found that either a cloth or their fingers were too harsh, but by wiping the brush clean between their lips the proper erasing point could be obtained. This led to the so-called practice of "tipping" or pointing the brush in the lips. In some plants the brush was also tipped before painting a numeral. The paint so wiped off the brush was swallowed.

The luminous paint is a mixture of a gum binder, zinc sulphide, and enough radium, mesothorium-1, or radiothorium to give the required fluorescence. The mixture is about 1 part of radioactive material in 40,000 of paint.[6] Depending on their skill, the workers tipped the brush from 1 to 15 times per dial, and painted 250 to 300 dials per day. A worker who licked 1 mg. of paint from her brush 4 times per dial, 300 dials per day, 5 days per week, would therefore ingest about 4,000 micrograms of radium in 6 months. When fixed in the bones, as little as 2 micrograms of radium has been fatal. Only rapid elimination of ingested radium, mainly in the feces, prevented prompt death.

C. Radium solutions have been used by some physicians in treatment of such ailments as gout, arthritis, cancer and leukemia. A fraction of the radium is deposited in the erythrocyte and leukocyte producing areas, and irritates these parts, with the result that there is an increase of both red and white blood corpuscles, and an apparent improvement in health. A period of overstimulation and then one of exhaustion may follow in which there is marked leukopenia and regenerative anemia, followed by fatal terminal infections. Apart from these effects on the blood forming apparatus, radioactivity has never been proved to be a specific therapeutic agent in internal medicine.[7, 8, 9]

D. Those who, in hospitals, chemical or physical laboratories, or mines, handle radium solutions, make up radon

needles, or otherwise come in contact with radioactive dust or radon contaminated air, have been victims of fatal anemia in which radioactive substances were introduced through their lungs.[7, 10]

E. Fortunately, most of the radium "activators" sold for treating drinking water contain far less radium than their vendors claim.[31] So far as I know, no deaths have been traced to these devices; but in spite of years of trial, there is no controlled clinical evidence that this radon water is beneficial.[11] Those activators in which the water comes in contact with the radioactive source become dangerous when this material is appreciably dissolved in the water,[10] for here one would be drinking radium water—not radon water. The better grade of "activators" will produce a radon concentration of 0.01 microcurie * per liter in water in 1 day, or 0.15 microcurie per liter in 1 month. As normally used, the water will have a radon concentration of about 0.1 microcurie of radon per liter, and also 0.0001 microgram of radium per liter.

EXIT OF RADIUM FROM THE BODY

The normal body throws off a large percentage of any radioactive material taken into it.

Where radon is breathed in, it remains in the blood only about 3 hours.[10, 12, 13] Where radon water is drunk, the gas is carried by the blood to the lungs, where it passes out by diffusion and is soon lost from the body in breathing.[14] The equilibrium distribution ratio (Henry's law constant) between blood and air at body temperature is between 0.42 and 0.31 to 1 by volumetric concentration.[15, 16] During the few hours that radon is in the blood, about 1 or 2 per cent of it decays into the solid radioactive product radium A, some of which is deposited permanently in the system and continues in the radioactive decay series until, after emitting 4 alpha and 4 beta particles per original atom of radon, it eventually becomes lead.

When radium is taken into the system it behaves in a manner similar to lead, being carried in the blood until it is either deposited as colloidal matter, principally in the bones, marrow, spleen, liver and lungs, or is excreted. After taking a soluble radium salt by mouth a much greater fraction is eliminated in the first 4 days than if it is received by intravenous injection.[14] Thereafter the rate of elimination of radium is quite independent of the mode of entrance. According to the individual, from 2 to 35 per cent of the radium received by mouth remains in the system more than 5 days after ingestion,[14, 17] while 55 to 65 per cent received by intravenous injection remains more than 5 days.[14] By the 10th day after taking radium, the rate of elimination is below 1 per cent of the quantity remaining in the system. Several years after taking radium the rate of elimination is down to 0.002 to 0.005 per cent per day.[17] At this low rate it would require about 45 years to eliminate half the radium in the system.

About 90 per cent of the radium eliminated is excreted in the feces, the remaining 10 per cent in the urine.[14, 17] No radium is eliminated through the skin, as has been demonstrated by heavy sweating of a subject following an intravenous injection of 100 micrograms of radium.[18] Although no radium can be exhaled in the breath, some radon does leave the system in this way, thereby relieving the body of the severe alpha particle bombardment from the decay products of radon. The fraction of the radon expired varies between the extreme limits of 2 and 40 per cent[17, 19] of the total amount of radon produced in the body by the decay of radium.

* When radioactive equilibrium is present one curie of radon is associated with each gram of radium. Micro- = one millionth.

Efforts have been made to speed up the normal rate of elimination of radium. Martland [7] tried without results to mobilize the radium deposits by intravenous injections of rapidly oxidizing colloidal solutions and by exposure of the body to ultra-violet light.

Aub found that a temporary acidosis, induced by the use of ammonium chloride, converted insoluble calcium and lead salts into soluble salts and expedited their excretion, particularly if the subject was on a low calcium diet. Following the original work of MacCallum and Voegthin, and later of Collip, Aub [20] found that the injection of parathormone mobilized calcium and lead. Because the chemistry of calcium and radium is somewhat similar, Flinn and Seidlin [21] inferred that advantage could be taken of this knowledge of calcium metabolism to speed up the normal elimination of radium. In 1929, 3 patients were each given parathormone every other day for a month, the dosage beginning at 10 units and working gradually up to 40 units per day. After a 2 weeks' rest, the treatments were continued, with 40 to 50 units injected every other day for 2 weeks. The 3 patients originally carried about 10, 20, and 40 micrograms of radium respectively; each patient lost about half of her radium during the treatment, gained weight and improved in general condition. One has since died of a brain tumor, the other 2 are still alive, but not in good health. Later, Flinn [22] reported that 20 drops of viosterol given 3 times a day considerably hastened the elimination of radium. The mobilization of radium through calcium therapy seems at present to hold the only rational hope for the treatment of radium poisoning.

SYMPTOMS

In September, 1924, Dr. Theodore Blum, a New York dentist, reported [23] his belief that a case of osteomyelitis of the mandible and maxilla, in a dial painter, which appeared similar to phosphorus necrosis, was in reality due to the action of radioactive substances taken into the mouth. The failure of the jaw to heal after the extraction of teeth, and the development of necrosis and osteomyelitis of the jaw is not only the condition which led to the first identification of radium poisoning, but remains today one of the first symptoms noticed in new cases.

The same symptoms are exhibited by victims of radioactive water nostrums [5] and by dial painters.[7] Symptoms may fail to appear until several years after the ingestion of radium has been discontinued. These facts lend weight to the belief that the jaw and mouth are slightly less resistant to radioactive bombardment than are other parts. Gingivitis, buccal infection, bone necrosis and osteomyelitis, low blood pressure, and regenerative anemias resembling true pernicious anemia are the most common symptoms of radium poisoning. X-ray examination will often disclose sharply circumscribed, nearly circular areas of rarefaction in the skull.[21] Particularly in the cases which have long resisted the alpha ray bombardment of radioactivity, radiation osteitis and osteogenic sarcoma, often accompanied by slow-healing, spontaneous fractures, are quite generally present.[24]

The occurrence of pregnancy is possible in victims of radium poisoning. The administration of ether anesthesia to victims of radium poisoning has been fatal in 3 cases.

For a more detailed discussion of the symptomatology of radium poisoning the reader should consult the excellent papers of Martland [7, 24-28] and his coworkers.

Here it will suffice to point out that in cases where a radium history is suspected, the physician need never remain in doubt as to the presence of radium poisoning. Regardless of the presence

or absence of pathologic symptoms, the physicist offers at least 6 unambiguous physical laboratory tests for radium poisoning in living persons, only 2 of which (2 and 3 below) demand the presence of the patient in the laboratory.

1. Rapid and very sensitive, is the ionization-chamber-electrometer test of expired air for the presence of radon or thoron.[7, 14, 19]

2. The gamma ray ionization-chamber-electrometer test for penetrating gamma radiation from the patient's body is widely used, and is best able to give a quantitative idea of the total amount of radioactive material contained in the system.[7, 17, 19]

3. The Geiger point-counter and the Geiger-Müller tube-counter are sensitive, low pressure, electrical instruments which discharge when a radiation passes through them. When connected to a vacuum tube amplifier and a radio loud speaker they register as clicks in the speaker the number of quanta of radiation effective in them. Such an instrument placed near a victim's body will show a noticeable response to gamma radiation from the patient.

4. A small fraction (*ca* 0.005 per cent daily) of the radium in a victim is eliminated daily in the feces. Sensitive emanation electroscope methods[17, 29] can be used for detecting radium in a solution of fecal ash. With proper apparatus, this method is extremely sensitive.

5. About one-ninth as much radium is eliminated daily in the urine as in the feces. Urine ash can also be tested by the emanation method.

6. Where a dentist has removed a tooth or a sequestrum from the jaw, radioactivity, if present, can easily be detected by at least 4 methods: the gamma ray ionization chamber, the Geiger or Geiger-Müller counters, the alpha ray emanation electroscope, or by self-photography due to the action of its beta and gamma rays on a photographic plate.[5, 26, 30]

DISTRIBUTION OF RADIUM IN SYSTEM

Radioactive material tends to be phagocyted into the bones, marrow, spleen and liver. Because of its bearing on other heavy-element poisoning cases, the study of the distribution of radium in a victim of poisoning can be of considerable value. These can be carried out with some precision, because radioactive quantitative analytical methods are over a million times as sensitive as ordinary inorganic analytical technic.

A total of from 2 to 180 micrograms of radium in the entire body has been measured in the fatal cases to date. Depending on the resistance of the individual's system, from 2 to 10 micrograms of radium, when fixed in the system, is a fatal dose.

The radioactive self-photographs of the bones of deceased victims show a lack of uniformity of distribution of radium.[26, 30, 32] In some cases two or three small areas will be brilliantly self-photographic, while the remainder of the bone will display only a moderate amount of fairly evenly distributed radiation. This irregularity of distribution is important as an independent fact, as well as a warning that an analysis of a fragment chosen at random may not be representative of the entire bone from which it came.

Post-mortem radium analyses have been made on individuals who acquired

TABLE I

	I	*II*	*III*
Vertebrae	100	100	100
Jaw	...	51	20
Femur	...	48	27
Tibia	...	30	...
Skull	...	18	...
Rib	...	...	11
Teeth	...	...	46
Heart	0.5	...	0.01
Brain	...	0.4	...
Stomach	0.0	...	...
Liver	65.0	0.5	0.05
Intestines	2.0	...	...
Spleen	8.4	0.9	0.05
Lungs	17.0	2.2	0.04
Kidneys	0.4	...	0.17

I. Diagnosis, Cancer of Uterus. One milligram radium injected Sept. 1, 1913. Autopsy held Dec. 17, 1913. The high radium content of the liver and other organs shows radium was still being fairly rapidly eliminated from the system.

II. Diagnosis, occupational poisoning, watch dial painter. Died Sept. 12, 1922. Body exhumed and autopsy held Oct. 15, 1927.

III. Diagnosis, poisoning from drinking radium water nostrum over a period of 5 years.

their radium by: (I) intravenous injection,[12] (II) dial painting,[30] (III) drinking radium water nostrums.[5] The original data have been recomputed and are presented in Table I in a form which shows the *relative concentration* of radium in the various bones and organs before ashing them for analysis. For reference purposes the concentration of radium in the vertebrae, measured in grams radium per gram of bone, is taken as 100.

SUMMARY

Radium poisoning results when a few micrograms of radium or other alpha ray emitting solid radioactive substance become fixed in the system. Its action is principally to destroy the blood producing centers, and to weaken the bones. Calcium therapy, following Aub's and Flinn's work seems the only hope of removing radium from a victim's system. Modes of entrance of radium include the ingestion or breathing of radioactive substances by watch dial painters, chemists and miners, drinking radium water nostrums, and intravenous or other injections of radium by physicians.

From 60 to 98 per cent of the radium taken into the system is eliminated, principally in the feces (90 per cent) and urine (10 per cent). Some radon is lost in the expired air; no radium is lost in perspiration. Necrosis of the jaw, osteogenic sarcoma, and regenerative anemia are among the most common symptoms of radium poisoning. At least 6 unambiguous physical laboratory tests are available for identifying radium poisoning.

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Mechanism of Infection in Poliomyelitis*

HAROLD K. FABER, M.D.

Department of Pediatrics, Stanford University School of Medicine, San Francisco, Calif.

POLIOMYELITIS occupies a place of peculiar prominence among the acute infectious diseases which as medical men interested in the problems of public health and preventive medicine it is our task to control—for not only does it strike a special terror into the hearts of all parents but the recurrent epidemic waves appear to be rising higher and higher. We in California shall not soon forget the year 1930 when over a period of 7 months this plague spread from one end of the state to the other probably but little affected by our attempts at prevention or control.

There are not only many serious gaps in our understanding of epidemic poliomyelitis, but, I believe, some serious and widely accepted misconceptions as to the nature of the infection itself, particularly of the manner in which it enters the body, multiplies, invades and traverses the tissues and eventually produces its characteristic effects. Such faults must necessarily interfere with that clearness of thinking which is fundamental to any proper program of prevention, control and treatment.

Some of the questions that remain to be answered and that I wish to discuss are:

1. How is the virus of poliomyelitis conveyed to the human subject?
2. Exactly where is the anatomical site on which, when deposited, it can effect an entrance to the interior of the body so as to "take"?
3. What channels does it follow—the blood, the lymph, the lymphoid structures, the nerves—in passing through the body to reach the ultimate goal where ordinarily it exerts its peculiarly disastrous effects—the anterior horns of the spinal cord?
4. Why in some cases does the disease fail to cause paralysis, and can such cases—presumptively as dangerous epidemiologically as those with paralysis—be detected, or are their symptoms frequently indistinguishable from those of other infections?
5. In what ways may we hope to improve the chance of effective control by prophylaxis and specific treatment?

1. That the virus of poliomyelitis is frequently and perhaps most commonly conveyed directly from one person who harbors it in the nasopharynx to another is a generally accepted belief which it is not necessary to question. That this is the only, or the only important, mode of convection there is some reason to doubt. Leaving aside such rare modes of transportation as milk, it seems clear that the simultaneous outbreaks of cases over widely scattered areas without known immediate contacts, the peculiar seasonal incidence during the warm and dusty months, the known resistance of the virus to drying and the probable portal of entry through the nose, all suggest a possibility of air convection in dust that deserves further investigation. This is a problem that has received much less consideration and direct study than it merits, although Neustadter and Thro,

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in 1911, showed the presence of virus in the sweepings from a sick room. Dust transmission, while as yet unproved, might explain some obscure features in the epidemiology of poliomyelitis, and it is desirable that future research be devoted to the problem.

2. It is reasonably certain that the anatomical site of implantation and initial infection in poliomyelitis is the nasal mucosa, not the lower respiratory or the gastrointestinal tracts. Time is lacking to review all the evidence on this point, but it may be noted that: (a) the nasal mucosa is the only portion of the body surfaces where poliomyelitic infection can be produced with regularity and without trauma (Flexner has long upheld this view and recently Schultz and Gebhardt have reported "takes" in 43 out of 46 monkeys so treated); (b) other surfaces, such as the gastrointestinal, have been shown to be impermeable to the virus; (c) infection is accomplished with the utmost difficulty by way of the blood stream, only succeeding when enormous amounts of virus are introduced and only after a significantly delayed incubation period; (d) active virus has been detected on the nasal mucosa in patients with the disease, in carriers, and in 1 instance in a person who 5 days later came down with the disease.

The site of entry can be even more sharply delimited. It is obvious that the virus has a particular adaptation to nervous tissue and it is well established in experimental work that bringing virus into direct contact with nervous tissue is the only method reasonably certain to produce infection.

While the central nervous system is embryologically ectodermal there is only one situation in the mature vertebrate organism where it remains exposed on the very surface of the body and this is the so-called olfactory epithelium. Since this is probably the area through which poliomyelitic virus enters the body, it may be noted that in the adult it is located high in the nose, in the superior meatus and the corresponding portion of the nasal septum, beyond the point reached by the air currents during quiet respiration, but that in the child it is relatively much nearer the external openings of the nostrils, a point that may have some bearing on the age incidence of poliomyelitis. By forcible inspiration and sniffing air is drawn directly over this area and material contained in the air deposited on the surface. Normally, most of the surfaces of the nose, especially in the middle and superior meatuses, are overlaid by mucus which moves downward and backward toward the nasopharynx under the influences of ciliary action, traction by swallowing, etc. The presence of the mucus and its movements are of the utmost protective importance in catching and removing particles of sputum and dust that may be inspired before they can reach and infect the mucus membranes themselves. The structure of the olfactory membrane renders it, moreover, particularly vulnerable to attack by a virus capable of infecting it, once this virus has been carried to its surface. The processes, the olfactory hairs, of the olfactory cells are by no means all embedded in the surface mucus but a large proportion of them actually lies free on the surface, directly exposed to the air—an arrangement essential to the sense of smell in all air-breathing vertebrates. Particulate matter carried by the air will then be deposited directly upon the long terminal processes of the olfactory cells, and if later embedded in the mucus will come in contact with the shorter olfactory hairs.

The possibility of exposure outlined takes on a particular importance when considered in relation with the known neurotropic properties of poliomyelitic

virus because the olfactory cells in the nasal epithelium, of which the olfactory hairs are essential parts, are in fact nerve cells connected by their axons directly with the central nervous system. The only direct communication between the nasal surface and the olfactory bulb is through the axons, or axis cylinders. Perineural lymphatics are probably not in immediate connection with the central nervous system but, if they do exist, communicate with the subarachnoid space, not with the bulb itself. There are no direct vascular connections between nasal mucosa and the central nervous system proper, and since the olfactory nerves are unmyelinated there is no communication even through myelin sheaths. These points, as well as others to be mentioned later, are of particular importance in relation to the experiments of Fairbrother and Hurst and of Hurst, which demonstrated a fundamental principle of poliomyelitic infection; namely, that the virus is propagated along and through the axons of the nervous system. The normal anatomy of the olfactory mucosa and nerves, therefore, is seen to offer a direct channel for a virus with the known properties of that of poliomyelitis, to ascend directly from the surface into the very substance of the central nervous system.

Can such ascent in fact be demonstrated? In 1912 Flexner and Clark swabbed the surface of the nasal mucosa in a monkey with a suspension of poliomyelitis virus; 48 hours later, they killed the animal and found virus present in the olfactory bulb but not—and this is important—in either the medulla or the spinal cord. They drew the justified conclusion that the virus had ascended through or along the olfactory nerves to the bulb and had not spread through the blood or cerebrospinal fluid, else the more susceptible medulla and spinal cord would have become simultaneously infected. By reason of technical difficulties this experiment appears not to have been repeated. Recently, however, with Gebhardt's assistance, I was able to confirm and amplify the result. On the fourth day of incubation, when virus was first demonstrated in the central nervous system, it was strictly limited to the olfactory bulb and was not found in the brain stem, cerebral cortex, pons, medulla, spinal cord or dorsal ganglia. In the olfactory bulb, however, it was present in a very high concentration. It seems fair to conclude that *the olfactory bulb is the initial focus within the central nervous system of poliomyelitic infection.*

3. The next question is what pathways the virus follows in reaching out toward the spinal cord where it produces its most characteristic end effects. Is it through the blood stream, through the cerebrospinal fluid, or through the substance of the nervous tissues? If through the blood stream we should during the ensuing days of the incubation period find the virus evenly distributed through the central nervous system, or at least through the highly susceptible medulla and spinal cord. If through cerebrospinal fluid the spread should be similarly diffuse and rapid, since the circulation of this fluid to all levels of the central nervous system is rapid, as shown by familiar experience with dyes, and infectious material introduced into the cerebral subarachnoid spaces would reach the spinal spaces within a few minutes. If spread is through the axons it should be much slower and virus should be found successively, during the incubation period, in the central ganglia, medulla and cord, since it is by these paths that the outgoing tracts of the olfactory system connect with other portions of the central nervous system. The localizations of virus on the fifth, sixth and seventh days, as determined in our experiments, did, in fact,

correspond closely with the axonal route postulated, and no virus was found in the spinal cord until the seventh day. Moreover, no virus was found even in the cerebellum, on only one occasion in the cerebral cortex and then, on the seventh day, in the olfactory region of Ammon's horn. The experiments, then, show that virus is propagated along the axons rather than in the cerebrospinal fluid (as had been shown by Fairbrother and Hurst) and, in the laboratory animal at least, along a particular route through the olfactory nerves, bulb and tracts and thence through connecting tracts to the medulla and cord, avoiding the cerebral cortex and cerebellum.

What reasons are there to believe that the same route of propagation holds true for human infection? First, the portal of entry appears to be the same. Second, as shown by various pathologists (Harbitz and Scheel, Müller, Wickman and others) the distribution of lesions in the brain and brain stem closely corresponds with the route described—an abundance of lesions in the central ganglia, midbrain, medulla, with few, slight or no lesions in the cerebral cortex and cerebellum. Third, the early symptomatology of the disease, as was suggested many years ago by Redlich, is strongly suggestive of a central nervous origin. Moreover, a careful analysis of the onset and later preparalytic symptoms which I have recently made, shows that the very first manifestations of poliomyelitis may well originate in the upper portions of the brain stem which are directly connected with the olfactory tracts, while the subsequent signs and symptoms apparently originate in the medulla, posterior horns of the cord and dorsal ganglia with final implication of the anterior horns. Thus, the clinical manifestations not only harmonize with the animal experiments as evidence of spread of the disease solely within the central nervous system, but supplement them by showing the pathways followed by the infection within the spinal cord itself.

4. The non-paralytic, so-called abortive type, of poliomyelitis is of much theoretical interest and even greater practical importance, especially to the epidemiologist and clinician. This type of case is explained by the failure of the virus to complete its journey to the anterior horn cells of the cord or to die out before it has lethally infected them. Since this occurrence is but rarely noted in monkeys the experimental study of the subject is difficult, though the tendency for the virus to die out in areas of the brain previously infected has been noted by Fairbrother and Hurst, and was also evident in our experiments of the 7th day. From a practical standpoint, interest focusses on the frequency of abortive cases in man and the possibility of detecting them with regularity and reasonable certainty, particularly because it may be supposed that such relatively mild cases afford, especially if ambulant, means for the spread of contagion. The frequency of such cases has by some been estimated as high as 10 to 1 in relation to those with frank paralysis, and it has often been thought that during or preceding epidemics many very mild illnesses, characterized by slight fever, mild respiratory or gastrointestinal disturbances, and presenting no pathognomonic features of poliomyelitis are in fact mild and unrecognizable forms of that disease. This conception, which during epidemics has led to a considerable amount of apprehension and hysteria in the minds of the lay public, has no very convincing factual basis. Though varying considerably in different epidemics, the ratio of non-paralytic to paralytic cases is probably on the average not more than 2 or 3 to 1. More important, it is now exceptional for cases of poliomyelitis to fail of diagnosis. The

increased familiarity of the medical profession with the disease and its alertness for early diagnosis are responsible for this. The studies of Aycock and his associates in Massachusetts showed few missed cases, and that minor infections occurring during an epidemic period of poliomyelitis could not be shown to have been mild poliomyelitis by subsequent tests for immunity. It is only in very exceptional cases, non-paralytic as well as paralytic, that the first lumbar puncture fails to reveal characteristic changes. Moreover, it is becoming increasingly clear that the early clinical picture of poliomyelitis is characteristic, generally recognizable and essentially identical in the cases that go on to paralysis and in those that end without it.

The very existence of abortive cases and their occurrence in considerable numbers point to a fact that is little appreciated; namely, that the virus of poliomyelitis is, on the whole, rather poorly adapted to survival in man, or, to put it another way, that the great majority of human beings possess very considerable powers of defense against it.

The course of the disease even in patients who have some residual paralysis supplies further evidence of this fact, since in the average case only a few restricted areas of motor cells in the cord or medulla are destroyed and the rest are either unaffected at all, or, if affected during the acute phases of the disease, recover their function completely, as shown by diminution of the extent of paralysis; moreover complete recovery of the sensory cells, almost always involved early in the disease, is practically uniform when the patient survives. The fact that about 80 per cent of urban adults possess specific immune serum antibodies against poliomyelitis must indicate that they at one time harbored the virus and resisted its effects.

5. This obvious fact of poor adaptability of the virus to human tissue or of effective defense against its attack offers at the same time a basis for some optimism in regard to the possibilities of prevention, if not of treatment. If the virus tends in the average case to die out quickly, cannot this tendency be increased by artificial means before or during the actual attack? The hopes and disappointments of serum therapy in poliomyelitis are familiar to all. At present there is widespread pessimism over the value of convalescent serum, based in part on the results of experimental work and in part on clinical observation. In the monkey, it is apparently impossible to prevent the disease from developing or even to modify its course by the administration of immune serum very long after inoculation of virus into the brain or even on the nasal mucosa. It is, however, only fair to point out that poliomyelitis is a much more severe infection as a rule in the monkey than in man, leading almost regularly to complete paralysis and death; whereas in man the average mortality is only 15–20 per cent; not over half of the total cases show residual paralysis and in the majority of these a relatively small proportion of the total muscle mass is involved. It might be expected *a priori* that the administration of serum would still further lessen the incidence and extent of paralysis in treated patients and this was apparently shown by the studies of Aycock and Kramer in the Massachusetts epidemic of 1929, and by Amoss in a subsequent study. More recently Kramer and his associates, and Park and his associates, have cast serious doubt on the occurrence of any beneficial results from serum, by their clinical comparisons of treated and untreated cases in the same locality and period of time. Nevertheless, I believe that judgment may be suspended until further trials have been made. My

reasons for this are that the sera generally used have been of unknown, and probably in many cases, defective strength in respect to the concentration of antibodies, and that the amounts used and the methods of administration may often have been seriously inadequate. The convalescent from poliomyelitis does not necessarily show a high degree of specific immunity in his serum; in fact, there is reason to believe that it is not infrequently low and that, in some instances, he originally acquired the disease because of an inherent inability to form antibodies in normal amounts. Individuals who have never had manifest poliomyelitis may have much higher concentrations of immune substances in their serum. The situation might be compared with that in the treatment of diphtheria if the only antitoxin used had been of untested, unknown titer, employed in inadequate amounts. In poliomyelitis it is possible to make a more convincing test of therapeutic value than has hitherto been developed, by using as donors only those individuals—preferably adults—who, irrespective of previous poliomyelitis, are known by specific test to have highly immune blood, thus overcoming the restrictions of serum supply that are incidental to the exclusive use of convalescents, most of whom are young children. A perhaps more promising source of really potent serum has been made available by the discovery that some horses and other animals can be immunized to a very high degree—much higher than any observed in man—and so provide therapeutic serum in large amounts. The value of really intensive therapy still remains quite problematical. Park assumes that once the virus has lodged within the nerve cell it is inaccessible to the circulating antibodies. This is probably correct but I have elsewhere pointed out that for poliomyelitic infection to run its full course to lower motor neuron paralysis it is necessary for virus to escape from an infected cell, to traverse the synaptic space between it and the next neuron and in this space to be exposed to the interstitial fluids, which presumably contain immune substances derived from the blood stream. For this theoretical reason, a thoroughgoing trial of really intensive serum therapy is worth making.

The chances of effective prophylaxis in poliomyelitis are in some respects at lease hopeful. It is true that no safe or certain method of active immunization, even in the experimental animal, has as yet been developed, despite long continued, energetic and extensive study by many investigators. Nevertheless, the results of some of the virus modifications and of intracutaneous inoculation afford a basis for encouraging further study. The curious fact that subinfective inoculations into nerve tissue give no immunity suggests that immunity, or at least the production of immune virucidal substances in the serum, is the result of an extranervous reaction to the virus rather than of actual, subclinical infection. If this be true, the prospect of eventually developing a safe and effective method of active immunization appears to be distinctly hopeful. While active immunization is at present a hope rather than a reality, passive immunization as a means of preventing infection during epidemics appears to be already of practical, if limited, importance. It is known from experiment, that animals can be protected for a time from the effects of virus inoculation by the preliminary or simultaneous injection of immune serum, and in human beings it appears to be well authenticated that passive protection to another virus disease, measles, is practicable. Even though passive protection from the injection of immune serum in general appears to last only a few weeks, such protection is decidedly worthwhile. The use of

convalescent or normal serum (from parents or others) for this purpose has been carried out on a fairly large scale in Pennsylvania, in the epidemic of poliomyelitis, 1932, with apparently beneficial results, and I believe that we are no longer justified in reserving immune serum for exclusive use in treatment of patients who have already developed the disease. Here again, I strongly urge the use of tested serum, known to contain virucidal substances in substantial concentrations. This will require organization and financial support in advance of epidemics, since, for passive immunization, human serum is decidedly preferable to that of horses or other animals in order to minimize sensitization. It is perfectly feasible to test potential donors in sufficient numbers to provide an adequate supply of high grade human serum for any given community, since it has been shown that about 80 per cent of normal adults have specific immune substances in their blood, and of these a very considerable percentage have them in reasonably large amounts. This is a matter which state and municipal boards of health should look into with a view to obtaining adequate appropriations. There is no disease over which the public is more apprehensive and in which both the laity and medical profession feel more helpless, and I believe that an effort to supply any promising method of defense would meet with prompt public support.

NOTE: References, here omitted, as well as the analysis of symptoms and other matter referred to in this paper will be found in a review by the author that appeared in *Medicine*, May, 1933. The experiments by Faber and Gebhardt are reported in detail in the *Journal of Experimental Medicine*, June, 1933.

Destruction of the Vitamins by Pasteurization

THE only vitamin which has been shown to be destroyed by pasteurization is vitamin C, and the destruction is only partial. The only disease due to a vitamin deficiency, which has been shown to be associated with the use of pasteurized milk, is infantile scurvy. This disease results from a deficiency of vitamin C, and in some of the cases reported the cause was traced to the use of milk which had been pasteurized more than once. However, even on complete diets of efficiently pasteurized milk, the danger of mild scurvy must be considered to exist, and diets for children should always be supplemented by other sources of the anti-scorbutic agent, *e.g.*, orange juice. This practice is widespread today, but it is not generally recognized that any ordinary bulk milks, whether raw or pasteurized, represent comparatively poor and variable sources, not only of vitamin C, but of certain other vitamins. Under these circumstances there is considerable force in the argument that dependence on complete milk diets as efficient vitamin sources should be discontinued. The merit of including raw milk in the diet of young children for the prevention or arrest of dental caries has been demonstrated, but the contention that pasteurized milk is not an efficient agent has been shown to be unproven.—The Nutritive Properties of Milk in Relation to Pasteurisation. J. D. Stirling and J. H. Blackwood. Hannah Dairy Research Institute, *Bull. 5*, p. 71.

Natural and Induced Variations in the Vitamin Values of Milk*

H. C. SHERMAN

Department of Chemistry, Columbia University, New York, N.Y.

THE mammals which man has domesticated, and whose milk is now largely diverted to purposes of human nutrition, have doubtless played a large part in so nourishing the human family as to permit of its evolving a type of life-cycle which provides liberally for mental and social development.

Doubtless what some evolutionists have called the "prolongation of infancy"—perhaps more clearly expressed as an extension of the learning period to occupy a larger part of the life-cycle of the individual member of the race—has probably been largely dependent upon the use of milk in human nutrition to a greater extent than was or is possible through human milk alone.

Thus there is a very far reaching significance in our employment of cows' milk as human food, and in the questions: How constant is this food in the various aspects of its nutritive value? How far have the different factors of nutritive value in milk been stabilized by evolution? How far can we control or improve them through our treatment of the cow which produces the milk or of the milk itself after its production?

These are large and somewhat complex questions. The need for brevity in this paper makes it seem wiser to treat them in somewhat general (even if sketchy) terms, in the hope of making clear the main principles involved, rather than to attempt a technical analysis of the experimental details with citations of original publications.

VITAMIN A

McCollum and Simmonds early showed that the vitamin A value of milk depends ultimately upon that of the food which the lactating female has received. That the vitamin A content of milk may be raised by the feeding of cod liver oil, kale, or fresh pasture has been shown by Drummond, Coward, and Watson; Kennedy and Dutcher; Golding and Luce; and Golding, Soames, and Zilva. On the other hand Fraps and his coworkers have shown that a cow previously well fed may supply vitamin A to her milk from her bodily store to such an extent that the fat of her milk continues to be of normal vitamin A value during many months of subsistence on a diet poor in vitamin A. MacLeod, Brodie, and Macloon found that milk produced under good and substantially uniform conditions of stall feeding was of practically the same high vitamin A value throughout the year. The Nebraska Agricultural Experiment Station reports that the vitamin A values of the milks of different breeds of cows do not differ as do the percentages of fat in these milks.

Undoubtedly the vitamin A of the mother's milk has important survival value for the species. This fact and such experimental findings as have just been briefly noted both support the view that evolution has in some measure

* To be read at a Joint Session of the International Association of Dairy and Milk Inspectors and the Food and Nutrition Section of the American Pubic Health Association at the Sixty-second Annual Meeting in Indianapolis, Ind., October 12, 1933.

stabilized the vitamin A content of milk, and that it has further provided for the maintenance of relative constancy in this regard by the development of the body's capacity to store vitamin A in relatively large amounts in times of abundant intake and to furnish vitamin A to the milk from this store during periods when the intake is low.

In view of the great importance of vitamin A for growth and healthy development, it is natural to find that the mammalian species have evolved the capacity to transfer rich stores of this vitamin to the milk whose sole function in nature is to serve as nutriment. And as cattle are furnished with a digestive apparatus which permits them to consume grasses and other leafy foods in very large amounts, and they have been bred to high efficiency and capacity in milk production, the milch-cow performs a most important service in bringing into form favorable to human consumption and utilization liberal supplies of vitamin or pro-vitamin A which have been formed in the green leaves of plants.

This fact, and the stabilizing influence of the factor of body storage, and the further fact that the rations which are economically profitable for the dairy farmer to feed are almost always of fairly high vitamin A value—all combine to bring about the result that under present-day conditions of actual practice the vitamin A value of ordinary mixed whole market milk is fairly uniform so that milk is both a highly important and a highly reliable source of vitamin A.

VITAMIN B

Recent research by Steenbock and his coworkers indicates that the vitamin B content of milk is "under physiological control" in the sense that it cannot readily be raised above a normal value by the feeding of more vitamin to the cow; and also in the sense that when this factor in the milk has been artificially lowered by the feeding of rations very poor in vitamin B, the normal vitamin B value of the milk is quickly regained as soon as the cow is again normally fed.

Here, as in the case of vitamin A, the rations which are found profitable in modern milk farming are sufficiently rich in the vitamin to make it fairly certain that milk made on such rations will predominate in the mixed milk which appears in the market under present-day conditions.

The striking results obtained at the Pennsylvania Agricultural Experiment Station show also that the digestive tract of the cow furnishes a favorable environment for certain vitamin-B-producing bacteria, so that a cow may continue to produce milk of normal vitamin B value even when her food is rendered abnormally poor in this vitamin for a long experimental period.

Thus, while milk is not an outstandingly rich source of vitamin B, it now appears to be a more constant and reliable source than has hitherto been appreciated.

VITAMIN C

What has just been said of vitamin B, is true also of vitamin C: milk is not a rich source of this vitamin, but is a more reliable source than is generally understood. Also milk and potatoes are typical of the foods which while having only relatively low concentrations of vitamin C are yet important sources of this vitamin because of the relatively large amounts in which these foods are consumed in an ordinarily well balanced American or European dietary.

Several years ago it was shown by the work of the Minnesota and Wisconsin Agricultural Experiment Stations and by that of Dr. Hess of New York City that the vitamin C value of milk

can be decidedly influenced by the feeding of the cow. These experiments were of fundamental importance but may have given rise to exaggerated impressions. Seeking clear-cut and conclusive results, the experimenters made use of rations differing more radically than is common in actual practice, and correspondingly they found larger differences in the vitamin C values of the milks produced than are apt to be found among the milks that ordinarily come to market.

Repeated tests at the Kansas Agricultural Experiment Station indicated a better maintenance of the vitamin C value of the milk even when cows were kept for long periods on vitamin-C-poor food. Whether there is a possibility of synthesis of vitamin C by bacteria in the digestive tract of the cow, as noted above in relation to vitamin B, remains to be determined.

MacLeod found that with good feeding such as modern dairy farmers already use in the interest of high milk production, the milk as sent to market by a large dairy farm in New Jersey was of practically constant vitamin C value throughout the year, and that this value is about 50 per cent higher than the estimates current in the literature would indicate.

Thus while there have undoubtedly been valid demonstrations of wide variations of vitamin C values of milk as induced by experimental feeding, the present evidence indicates strongly that such differences need not occur at any season of the year under the ordinary conditions of dairy farming, and need not be anticipated in the mixed market milk ordinarily delivered to consumers under present-day conditions.

VITAMIN D

Hitherto, the methods generally used in testing for vitamin D values have involved the employment of experimental diets of such drastically rickets-producing character that only relatively high antirachitic potencies could be demonstrated. With the use of more delicate or of more searching methods, it is now being found that several foods including milk are more important sources of vitamin D than previous work had indicated or than would be inferred from the statements still current in the literature.

However, in northern latitudes and in cities where the antirachitic value of sunlight is greatly diminished by smokiness of the atmosphere, it is to the advantage of the human infant (and perhaps of older humans as well) to receive more vitamin D than cows' milk as hitherto commonly produced can be depended upon to supply—hence the present interest in methods for the enrichment of the vitamin D value of milk.

A large amount of evidence now consistently indicates that this idea is scientifically and economically sound, and so distinctly to the advantage of the public health as to be worthy of encouragement and practical extension even during the period in which some of the methods of official control still remain to be developed.

Three different methods of enrichment of milk in vitamin D—(1) the direct addition of a vitamin D concentrate, (2) the irradiation of the milk, and (3) the feeding of irradiated yeast or other suitable irradiated material to the cow—have all been shown to be practicable and effective. As all of these methods were ably discussed in papers presented at the Washington meeting, it is not necessary to discuss them further here. All seem certainly to be meritorious; their relative merits will doubtless become clearer with further investigation and experience.

The fourth method which naturally suggests itself, namely, the irradiation of the cow, has thus far yielded rather conflicting evidence. Among the most

recent findings, those of Mitchell, Eiman, Whipple, and Stokes (reported at the Washington meeting and published in the *Journal* of December, 1932) seem on the whole to be encouraging.

Hence those who desire to secure and insure the enrichment of milk in vitamin D have a choice, certainly of three and perhaps of four, practicable methods. Even though this situation presents problems as to methods of official regulation, it is highly gratifying as an advance in the practical campaign for the eradication of rickets, and for insuring the public a milk supply of high and well balanced vitamin value.

VITAMIN E

For two reasons this paper does not attempt to summarize the case for vitamin E in parallel fashion with that of the other better known vitamins: (1) there seems to be no convincing evidence as yet that vitamin E is a practical factor in human health; and (2) methods for the quantitative measurement of the vitamin E values of foods have not been developed and standardized to the same degree as in corresponding work with the other vitamins here considered.

VITAMIN G

The differentiation of vitamin G (B_2) from vitamin B (B_1) is so recent, and the methods for the measurement of vitamin G values have even yet been adequately controlled in so few laboratories, that the extent and causes of variation of the vitamin G value of milk are probably best regarded as problems still awaiting precise quantitative development.

We have, however, considerable evidence that milk as ordinarily produced is a rich and reliable source of vitamin G at all seasons of the year. It is to be hoped that means can soon be found for such further quantitative research in this field as is needed to give greater precision and positiveness to our knowledge, for vitamin G is undoubtedly very important to public health and individual efficiency.

SUMMARY

While the vitamins differ too much among themselves, in chemical nature and in nutritional function, to permit of much generalization, the chief principles involved in the facts above summarized may be briefly recapitulated as follows:

1. The animal organism is not to be expected to synthesize vitamins *de novo* in the same sense that it synthesizes enzymes and hormones. In general, either the vitamin or its precursor must be furnished by the food or some other factor of the environment, such as symbiotic bacterial action in the case of vitamin B or irradiation in the case of vitamin D, must be provided.

2. The fact that the ordinary environment of the cow does provide such factors makes the vitamin values of market milk somewhat less dependent upon the vitamin values of the food of the cow in actual practice than has appeared to be the case in those researches in which artificially drastic conditions were set up and maintained for experimental purposes. In the case of vitamin A bodily storage also serves to regulate the vitamin value of the milk.

3. A further regulator of the vitamin value of milk as practically produced for market is found in the fact that the rations which are profitable for the dairy farmer to feed are not at any time of the year apt to be vitamin-poor; and if vitamin-poor rations are occasionally fed they do not produce a large enough amount of milk to influence seriously the nutritional character of the mixed milk which comes to market under the present-day conditions and methods of the milk industry.

4. In the one case in which this is less true than in the others, and in which therefore there is special reason for the fortification of the milk, namely with vitamin D, there are certainly three and perhaps four different practicable methods by which the desired enrichment may be accomplished.

5. In the vitamin G value of milk we have a recently discovered factor, of much importance in nutrition and food values, the precise evaluation of which must await further and more far reaching research.

Toxic Amblyopia and Accompanying Physiological Disturbances in Carbon Tetrachloride Intoxication*

ZOLTON T. WIRTSCHAFTER, M.D.
Cleveland, Ohio

TOXIC amblyopia is an ocular condition, characterized by dimness of vision and an alteration of the color fields, the etiological factor being, in most cases, a substance of exogenous origin.

In his discussion of toxic amblyopia due to carbon bisulphide intoxication, Knapp [1] states:

> . . . the patients complain of seeing through a cloud; there is the characteristic central disturbance of vision with a comparatively free periphery of the field and the loss of color perception in the center. The condition is usually bilateral and all the reports agree on the presence of the central defect with normal periphery of the field, characteristic for toxic amblyopia in general.

In the present study of toxic amblyopia due to carbon tetrachloride poisoning, perimetric examination revealed no central defect but a marked constriction of the periphery of the visual color fields. The subjective symptom of dimness of vision, however, was the same as in the usual toxic amblyopia as typified by carbon bisulphide poisoning.

OBSERVATION OF CASES

Five adult male workers from four establishments in the dry cleaning industry were examined. All of these men were exposed to carbon tetrachloride vapor from 8 to 10 hours daily for periods varying from 1 to 6 months preceding examination.

Case 1—J. L., a white male, age 20, had been exposed for a period of 5 weeks previous to examination. He complained chiefly of severe frontal headache associated with vertigo, tinnitus, nausea and vomiting. He was unable to eat without subsequently vomiting most of the ingested food. These symptoms started within a few days after commencing this work. About 3 weeks after exposure began, he noticed a gradually increasing disturbance of vision, manifested by seeing "spots before the eyes." He also complained of a marked disturbance of the sense of taste, so that "even cigarettes tasted like bile." Physical examination revealed a well developed white male, weight 218 lb., appearing somewhat lethargic and stuporous. There was moderate pallor of his skin. The sclerae had a slight icteric tinge. The pupils were normal and reacted normally to light and accommodation. Heart and lungs were normal. Abdominal examination was normal. Reflexes were physiological. Blood sugar tolerance analyses were as follows:

	Blood Sugar	*Urine Sugar*
Fasting	87 mg.	Slight
30 Min.	154 mg.	None
1 Hr.	115 mg.	Trace
2 Hr.	99 mg.	None
3 Hr.	90 mg.	None

* To be read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-second Annual Meeting in Indianapolis, Ind., October 10, 1933.

Case 2—F. K., a white male, age 43, had been exposed to the carbon tetrachloride vapors for a period of 10 weeks previous to examination. Before the period of exposure he had been in good health. Since working at the dry cleaning plant, he had had continual nausea but did not vomit. The nausea was accompanied by marked dizziness, headache, and weakness. He suffered no pain of any kind. About 2 weeks after commencing work, his vision became blurred and his eyes felt greatly irritated. In addition to the above complaints, there was marked polyuria and constipation. Physical examination showed a well developed white male, weight 165 lb., appearing somewhat weak and lethargic. The conjunctivae were congested and there was marked epiphora. Heart was normal. They were a few moist râles at both lung bases. The abdomen was normal. Reflexes were normal. Blood sugar tolerance analyses were as follows:

	Blood Sugar	*Urine Sugar*
Fasting	90 mg.	Slight
30 Min.	169 mg.	Moderate
1 Hr.	150 mg.	Large Amt.
2 Hr.	84 mg.	Mod.
3 Hr.	61 mg.	Slight

Case 3—H. M., a white male, age 30, had been exposed for a period of 4 weeks previous to examination. During this period he had severe diarrhea with moderate abdominal pain. Two weeks after the onset of the exposure nausea and vomiting began. The vomiting occurred about 15 minutes after each meal, being most marked after the noonday meal. In the period after the onset of the gastric symptoms he lost 6 lb. in weight. He complained of increasing muscular weakness and lassitude. Physical examination revealed a well developed white male, weight 146 lb., appearing markedly irritable. There was marked skin palor. The conjunctivae were congested and there was marked epiphora. Heart, lungs and abdomen were normal. There was slight exaggeration of the abdominal reflexes and also a slight tremor of the hands. Blood sugar tolerance analyses were as follows:

	Blood Sugar	*Urine Sugar*
Fasting	90 mg.	Slight
30 Min.	118 mg.	None
1 Hr.	95 mg.	Slight
2 Hr.	89 mg.	Slight
3 Hr.	80 mg.	Slight

Case 4—R. V., a white male, age 48, had been exposed for a period of 6 months before examination. He complained of severe dizziness, headache, nausea, and vomiting. The ocular symptoms in this case were more marked than in any of the others. He stated that everything looked smaller than previously; that he had black spots before his eyes continually. The dimness of vision became so marked that on several occasions while driving his automobile home from work, he had to stop for a few minutes until his vision cleared slightly before he could proceed further. At the time of examination he had ceased driving. Physical examination revealed a well developed white male, weight 207 lb. The skin showed slight pallor. The pupils reacted normally to light but more slowly to accommodation. Heart, lungs, and abdomen were normal. Reflexes were normal. Blood sugar tolerance analyses were as follows:

	Blood Sugar	*Urine Sugar*
Fasting	78 mg.	Slight
30 Min.	150 mg.	Moderate
1 Hr.	124 mg.	Large Amt.
2 Hr.	90 mg.	Slight
3 Hr.	74 Mg.	Slight

Case 5—I. H., a white male, age 44, had been exposed for 6 weeks before examination. He observed no symptoms until about 3 weeks after he began to work over the vats. He then began

to have nausea and headache but did not vomit until about 1 week later when the vomiting became very severe. At this time he was unable to retain any food in his stomach. The attacks of vomiting were accompanied by severe abdominal cramps. He also had attacks of diarrhea which varied in severity. He stated that for the past few nights he had been unable to sleep, although he felt sleepy and tired. During the period of exposure there had been a gradual but complete loss of sexual libido. During this period he lost 9 lb. in weight. Physical examination showed a well developed white male, weight 156 lb. The conjunctivae were congested and there was slight epiphora. Heart, lungs, abdomen and reflexes were normal. Blood sugar tolerance analyses were as follows:

	Blood Sugar	*Urine Sugar*
Fasting	96 mg.	None
30 Min.	124 mg.	Moderate
1 Hr.	116 mg.	Slight
2 Hr.	95 mg.	Slight
3 Hr.	90 mg.	Slight

Ophthalmoscopic examination in these cases did not reveal any abnormalities except a slight paleness of the disc. Toxic amblyopia being suspected, perimetric examinations of the five men were made. All of the men, including the two who had not suffered from visual disturbances, showed bilateral peripheral constriction of the color fields. No central scotomata were present in any of the perimetric charts. A B&L Stereo-Campimeter was employed in making all central field studies. Peripheral fields were checked up with a campigraph. Illumination in all cases and the size of the test object (1½°) were kept constant. A uniform procedure of examination was employed in all cases, targets being moved from non-visible to visible. Periodic observations in Case 1 illustrate the progress of a typical case. With the removal of exposure, the subjective visual disturbances as well as the general complaints disappeared. At intervals of 7 to 10 days, perimetric examinations were repeated, and revealed a gradual expansion of all the color fields which were found to be within normal limits 5 weeks after cessation of exposure.

PATHOLOGICAL PHYSIOLOGY

The pathological physiology of the toxic amblyopia observed in carbon tetrachloride intoxication appears to be closely associated with disturbances in carbohydrate and fat metabolism. Lamson [2] states that "carbon tetrachloride produces a liver necrosis with an increase of guanidine or guanidine-like substances in the blood with a subsequent fall of blood sugar." In this group of cases, the men had blood glucose concentrations which were at the lower border of the normal variation and, in some cases, even below this. Moreover, slight amounts of sugar were found in the fasting urine specimens and larger amounts after the administration of glucose, especially in Case 2. The blood sugars, urines, and the visual fields returned to normal after the men left their work and were put on a high calcium and dextrose diet. This therapy has been used in carbon tetrachloride poisoning by many investigators including Minot and Cutler.[3]

Recently, Adler [4] has demonstrated that that portion of vitreous humor of the eye which is in close contact with the retina contains less sugar than the more anterior layers. This was shown to be due to the fact that the retina has a greater glycolytic power than any other tissue of the eye, *i.e.*, the low sugar content of the vitreous is a result of the rapid utilization of glucose by the adjacent retina. All sugar entering the vitreous must first pass through the

retinal circulation, where a portion of it is consumed. Adler further demonstrated that sugar could not pass into the vitreous from the aqueous humor. He suggests that "possibly the retina, not having storage facilities for glycogen, is forced to use the glucose circulating in the blood for its metabolic need."

A lipemia and a cholesterolemia have been shown to be present in carbon tetrachloride poisoning as a result of central necrosis and fatty degeneration of the liver. MacMahon and Weiss [5] report an autopsy in a case of severe carbon tetrachloride poisoning in which the blood in the pulmonary arteries contained 64 per cent fat and in the inferior vena cava 25 per cent. They state that the source of the fat was the liver which showed severe injury. Butsch [6] reports a non-fatal case of carbon tetrachloride intoxication in which the blood fat on admission was 1,245 mg. per 100 c.c. estimated as tripalmitin, but which dropped to 765 mg. 3 weeks later. The serum cholesterol in this case was 856 mg. per 100 c.c. on admission and 563 mg. after 3 weeks. The patient was back at work 1 month after admission to the hospital.

According to Adler,[4] "there is clinical evidence that some substance present in the liver and in certain fats is concerned with rod-visual purple function." The periphery of the retina consists chiefly of rods, and, moreover, the visual purple is most abundant in this area. The scotomata which occur as a result of disturbances of the outer layer of the retina, which includes the rod-visual purple mechanism, correspond in "position, shape and extent to the retinal lesion."

Whatever theoretical explanation these facts may have, it is suggested that (a) as a result of the low blood sugar which is encountered in carbon tetrachloride intoxication, the retina is deprived of an adequate source of glucose, a constant supply of which is essential to the normal metabolism and function of the retina; (b) that another factor in the visual disturbance may be an alteration of the rod-visual purple mechanism of the periphery associated with the deranged fat metabolism.

Although the constitutional symptoms in the present series of cases were not especially severe, the constriction of the color fields was marked even in the mildest case. It is of utmost significance that carbon tetrachloride intoxication can be detected at an early stage by routine perimetric examination of exposed workers. It is probable that similar phenomena may be discovered by the same method in intoxications caused by other fat solvents, such as chloroform or benzol.

CONCLUSIONS

1. Toxic amblyopia may result from exposure to carbon tetrachloride vapor.
2. The resulting amblyopia is characterized by concentric constrictions of all the color fields without central scotomata.
3. The resulting amblyopia differs from the usual toxic amblyopia, of which that due to carbon bisulphide is typical, in that the color fields in the latter are marked by central scotomata with a normal periphery.
4. With cessation of exposure, and a high calcium and dextrose diet, the amblyopia rapidly disappear.
5. Routine examination of the visual fields of workers exposed to the vapor of carbon tetrachloride is suggested to detect intoxication at an early stage.

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"Food-Poisoning"—A Public Health Problem*

J. C. GEIGER, M.D., F.A.P.H.A., AND J. P. GRAY, M.D.
Department of Public Health, San Francisco, Calif.

FOOD-POISONING—as it is understood today—is the term used to describe the clinical syndrome resulting from the ingestion of food contaminated by certain types of bacteria. Although the affection has occurred more or less frequently, probably for centuries, its etiology and epidemiology, and therefore its control, have not been understood until comparatively recently. Having some knowledge of the etiology and epidemiology of food-poisoning, the lack of control over the mounting incidence of this reportable and preventable condition challenges students of public health and preventive medicine. The records in most departments of public health, particularly in those units enjoying fairly accurate reporting of the notifiable diseases, demonstrate the wide gap that exists between the comparatively poor results obtained with present day practice and those that could be had were the latest approved scientific methods properly applied.

In certain diseases, some of which have been devastating in their effects, as plague, malaria, yellow fever, smallpox, diphtheria, typhoid fever, and cholera, actual control has been approached, and even demonstrated on several occasions, particularly in armed forces; but any statement to the effect that tuberculosis, syphilis, influenza, acute anterior poliomyelitis, measles, and pertussis, as examples from a large group, are under control, is misleading, to say the least. While the epidemiology is not entirely complete, the etiology is well known in some of the diseases, as tuberculosis and syphilis, and, indeed, we are fairly well informed of methods that may prevent the transmission of the causative factors, as in both tuberculosis and syphilis, but who can deny that even in these diseases new infections arise occasionally from known reservoirs of infection under treatment and so-called supervision?

Obstacles present themselves to resist measures directed at the prevention of the transmission of communicable diseases and of the occurrence of certain non-communicable but preventable diseases; but the justification for public health activities lies in the necessity for overcoming these same obstacles. The possibility of the control of food-poisoning, though not so attractive in some respects, perhaps, as many other problems, is of importance, and offers certain difficulties which merit more attention than that usually given.

It is not the intent of this paper to decry the health official as a disinterested individual of limited intelligence. Frequently, in the past, it has been emphasized that the health officer was usually a man who had one or the other of two backgrounds: he was a failure, or too old to carry on, as a physician or surgeon in the clinical field but the public was willing to have him act as health officer, or, he was a

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politically ambitious physician who achieved sufficient prominence to be given the appointment irrespective of his qualifications. Today, however, the field of public health is attracting young men of excellent training and background, in whom there is activity, alertness, and enthusiasm in their expectations of careers in preventive medicine and public health. Too frequently, certain details and problems are lost sight of in the direction of activities in metropolitan organizations or in the varied duties in the limited personnel of rural units. It is the purpose of this paper to point out the need for a better understanding of the problem offered in the control of food-poisoning, to emphasize the obstacles operating against the achievement of actual control, and to outline a program to be followed in approaching the problem.

The etiology and epidemiology of food-poisoning is fairly well understood; indeed, we are better informed on the etiology of this type of illness than we are on many other of the communicable and preventable diseases, as, for example, influenza, acute anterior poliomyelitis, and measles. In methods of control, we do actually know how to prevent food-poisoning, in direct contrast to our comparative helplessness in the face of an outbreak of the diseases mentioned.

It is not possible, in a paper of limited scope, to do more than list and emphasize the major points. Every health official is familiar with the difficulties nearly always encountered in the investigation of food-poisoning, but in directing attention to these points, it is hoped that seemingly lagging interest in the entire problem may be rekindled. Most obstacles can be classified under one of the following major groupings:

I. Delayed reporting.
II. Passive interest of health official and public.
III. Inaccurate understanding of the etiology.
IV. Incomplete epidemiologic investigation.
V. Inadequate laboratory studies.
VI. Incomplete preventive service.
VII. Restricted dissemination of accurate information.
VIII. Lack of rational modern legislation.

Most of these obstacles to progress in the control of food-poisoning are met with in the control of all communicable and preventable diseases. With intelligent application of modern methods, all can be overcome. All but the first and last are direct responsibilities of the health official; and even for these exceptions (delayed reporting and lack of rational modern legislation), the health official must accept responsibility for the initiation of procedures necessary for their correction.

It is obvious that the success of any plan of attack directed at the control, not only of food-poisoning but of any communicable or preventable disease, will depend upon the effectiveness with which that plan deals with the obstacles presented. It is apparent, also, that the most important obstacle to be overcome lies in the correction of the lagging interest which affects the public health official as well as the public. The correction of all other difficulties outlined depends, directly or indirectly, on the health official's interest and initiative. The alert health officer will create a consciousness in professional and lay groups, and earlier reporting will be forthcoming; he will educate his organization to etiological understanding and from this background develop adequate epidemiological and laboratory study; he will improve the inspection service rendered by his organization, initiate well-founded and rational legislation, and make every attempt to enforce it with expedition; and, always, he will take advantage of every opportunity to disseminate accurate informa-

tion intelligently and intelligibly. Perhaps the most important step in the control of food-poisoning, therefore, is the education of the health officer.

Food-poisoning is usually considered as of two distinct types: (1) Botulinus poisoning, or botulism, is a comparatively rare affection of high fatality rate, caused by the ingestion of food contaminated with the anaerobe, Clostridium botulinus, in which toxic products are formed. (2) Food-poisoning, *per se*, is a rather common affection of low fatality rate, caused by the ingestion of food contaminated with certain types of organisms and their metabolic products, particularly members of the paratyphosus-enteriditis group and, apparently, certain strains of the heavy pigment-producing staphylococci.

In botulinus-poisoning, the clinical manifestations of neurologic dysfunction are probably due to a neurotropic toxin which affects important neurologic centers after an incubation period of from 24 to 48 hours. In food-poisoning, however, the clinical picture is that of a gastrointestinal intoxication, probably due to a gastrointestinal irritant which is the metabolic product of the organism, after a relatively short incubation period of less than 4 hours usually, and less than 12 hours nearly always.

Clostridium botulinus has a widespread distribution in the soil as a spore, and in this form is considered harmless to man. It is killed at temperatures easily attainable in commercial food processing, and the toxic product, formed by the anaerobe in suitable foodstuffs as culture media, is thermolabile, being destroyed by boiling usually within 10 minutes, depending on certain variable factors, as consistence and quantity of the food, size and shape of the container, altitude, et cetera. The foods responsible for botulinus-poisoning are usually of home-canned origin. The underlying cause for this probably lies in the so-called "cold-pack" method of canning, with inadequate temperatures and holding periods. The danger of commercially canned products as a source of infection in botulism is remote with present-day practice, which includes laboratory studies on each pack.

Members of the paratyphosus-enteritidis or food-poisoning group of organisms are not infrequently traceable to the gastrointestinal tracts of certain carriers, both human and animal, particularly rats and mice. These organisms are killed by comparatively low temperatures, but their metabolic products or poisons may prove to be thermostabile at various temperatures for different periods of time. Moreover, certain organisms usually considered innocuous, as, for example, proteus and cloacae groups, when they are permitted to grow in media or foodstuffs of high protein content, may also produce poisonous products which are gastrointestinal irritants to man. It must be realized, also, that even so-called invasive types of organisms, as *B. paratyphosus* (alpha) of human origin, as food contaminants, may cause food-poisoning only, without subsequent infections of more or less severe character.

Epidemiologic studies, while it is desirable to have them carried out by a medically trained personnel, may be made quite satisfactorily by lay inspectors or by public health nurses. The true epidemiologist has an inherent insatiable curiosity, combined with initiative and ability to determine the basic facts. These qualities must be present, at least to some degree, in the individual charged with the responsibility of investigating a report of food-poisoning. The art of question asking, as a means of obtaining accurate and unbiased information, is fundamental in its importance, and, in most instances,

requires development and training. Poorly asked questions often have been responsible for misleading and inaccurate information, in addition to the opportunities lost through the promotion of lack of confidence or antagonism toward the investigator.

The epidemiologist's primary interest lies in the particular food probably responsible for the affection. Careful questioning of a group of the individuals affected will furnish data of value in confirming the diagnosis and eliminating the various unrelated foods. Supplementing the determination of the food probably responsible, the epidemiologist obtains specimens of the food suspected, specimens of stool and urine from the food handlers, and of stool from affected individuals, particularly in those instances in which diarrhea is present. All specimens are to be obtained in sterile containers, without contamination from other sources, and sent to the laboratory, properly labelled, and as soon as possible. The epidemiologist has not completed his work until he has obtained every bit of essential information on the source of the suspected food, and definite data concerning the quality, condition, preparation, holding, storage and serving. The physical environment of the premises in which these procedures were carried out, with special attention to the possibilities of rat, mouse, and other animal infestation, and the methods employed in rodent control, is of import. A history should be obtained from every handler of the food, with specific data concerning the possibilities of any of the enteric fevers, not only recent but throughout his entire life.

Laboratory procedures are not fixed and unchangeable. Constant improvements in technic are being made, and health officials should assure themselves that methods used in their laboratories are kept up to date. The complete laboratory study must include the application of modern technic in conducting bacteriological, immunological, and biological reactions, and chemical tests as indicated; but these studies should be used as confirmatory evidence and as diagnostic aids only, and should not be substituted for epidemiological investigation. The laboratory worker who relies upon routine procedures of a decade ago is doomed to disappointment. The use of enrichment media, new buffer salts, lower or higher pH levels, closed chambers permitting controlled changes of gas tensions, new immunological reactions, absorption tests, new cultural reactions, animal and human feeding experiments —these and many other refinements of technic are contributions that have made possible adequate laboratory studies in food-poisoning. Most of these are possible in the laboratory that is well equipped but not elaborate in its set-up, and their accomplishment is not beyond the capabilities of the well-trained laboratory worker.

The health official who understands the etiology and epidemiology of food-poisoning, who carries out a rational and reasonably complete investigation, and who has available in his laboratory the latest approved technic, has an efficient agency for the study of food-poisoning outbreaks; and from each study something constructive can be gleaned and in turn practised to prevent recurrences. In the control of food-poisoning, something more is essential. The regulation and supervision of food establishments as carried out in most organizations is insufficient. Too frequently the food inspection service is concerned with the physical plant alone. Ratproofing, rodent infestation, waterproof floors, smooth, painted walls, refrigeration, ventilation, toilet and lavatory facilities, the outer clothing of the personnel:—these are important, but, in addition, the quality of the food, the preparation, holding, serving, and

handling of food, milk, and water, the cleansing of china and glassware, the polishing of silver, and, probably of greatest importance but so frequently not well supervised, the food handler himself—these are also full of possibilities as sources of infection in food-poisoning. In most cities in which health certificates are issued to food handlers, the medical examination has deteriorated into a venereal disease inspection, and the laboratory study consists of the examination of a smear for the gonococcus and a complement fixation reaction on blood serum, as evidence of gonorrhea and syphilis. The search for the bacillus carrier, not only of *B. typhosus*, but also for *B. paratyphosus*, *B. enteritidis*, and other members of this group, is the valuable examination often overlooked.

These activities are possible, of course, only if adequate legislation supports the health official. Legislation is dependent upon public opinion, and since public opinion is dependent upon education, there is a definite lag between new developments and the passage of legislation permitting the application of newer knowledge.

The great strides made in public health during the past half-century have been accomplished through the application of methods made possible as a result of research in the laboratory and the field. The epidemiologist, the bacteriologist, the immunologist, the physician, the dentist, the sanitary engineer, the public health nurse, the inspector, the veterinarian, the vital statistician, and the legislator—all have played their rôles; but in the years to come, further advances will be slow without health education. Most public health administrators recognize the need for organized programs in health education, but, unfortunately, funds are not available, in most instances, to promote this essential activity. It must be realized, of course, that health education, to be effective, must be planned, not in terms of months or years, but of decades. Through the dissemination of accurate information in an intelligible manner, the populace may be educated, and many goals, now seemingly beyond reach, brought nearer. The well-edited bulletin, of attractive though not elaborate or expensive format, regularly issued, and placed in the hands of the interested groups, as physicians, dentists, nurses, educators, teachers, civic leaders, parents and others, is a method deserving attention and study. The statistical leaflet, full of tabulations of morbidity and mortality rates and classified causes of death, with addenda of numbers of inspections made and samples collected, will not meet these requirements; such a periodical is almost never read by those not actually engaged in public health work. The publication should be augmented by other projects, as radio broadcasts, selected newspaper publicity, lectures, and talks to interested civic, service, parent-teacher, professional and lay groups, and by published scientific articles and reports. Every member of the personnel of the department, and particularly the public health nurse, should take advantage of every opportunity in every contact to make friends rather than enemies, to encourage cooperation rather than antagonism, and to teach prevention rather than cure. The opportunities offered in health education are manifold.

SUMMARY AND CONCLUSION

1. The removal of obstacles to the control of food-poisoning justifies public health activities.

2. With an understanding of the etiology and epidemiology of food-poisoning, actual control is not unattainable; but there must be renewed interest on the part of the health official, and, through him, the awakening of professional and lay consciousness.

3. Emphasis is placed on the importance of understanding the etiology and epidemiology, of laboratory procedure and preventive services, of legislation and regulatory supervision of establishments and healthy carriers, and of health education, as measures to be used in a plan for coping with the problem of the control of food-poisoning.

Food-poisoning, although its cause, effects, and prevention are fairly well understood, continues to be reported. Its control is a not unattainable objective, but it may be reached only through the rigorous application of present-day methods and procedure.

Amendment of Italy's Child Welfare Law

THE Italian law of 1925 establishing a national bureau of maternal and child welfare was amended April, 1933.

The law of 1925 provided for an annual appropriation of 8 million lire. This was soon found to be insufficient; therefore, according to the new law, the amount is to be determined annually.

For the purpose of obtaining greater flexibility the number of members of the council that administers the national bureau was reduced from 38 to 13, and that of the councils who administer the provincial branches of the bureau, called in the law provincial federations, from 21 to 11. Provision was made for the appointment to each provincial council of at least two representatives of maternal and child welfare agencies.

Under the old law each provincial federation had an executive committee of 9 members, selected from the members of the governing council of the federation. The committee attended to routine business, examined the questions to be submitted to the governing council, made suggestions, supervised the functioning of public and private maternal and child welfare institutions and, in general, the administration of the laws regarding maternal and child welfare. Under the new law the executive committee has been abolished, and for the purpose of greater efficiency the functions of the committee have been transferred to one individual, namely, the president of the governing council of the provincial federation.

Both the old and new laws provide for the establishment in each commune of a committee of citizens to carry out in that locality the functions of the provincial federation. The new law prescribes that the members of this committee must be experienced in maternal and child welfare work, whereas under the old law this was not required.

The old law prohibited the serving of alcoholic beverages, including wine, to children and adolescents in schools and all other educational establishments; the new law specifies an age minimum of 16 years.—*Gazzetta Ufficiale*, Rome, Apr. 26, 1933.

Ten Years of Public Health Administration in Ohio*

ROBERT G. PATERSON, PH.D.

Executive Secretary, Ohio Public Health Association, Columbus, Ohio

IN this interpretation, there is presented the 10-year experience of Ohio in public health administration—1920 to 1929 inclusive. Answers are sought to such questions as: has the number of public health commissioners increased? what was their age? how long have they served? what was their salary? what qualifications did they have? and, what was the relation of the year of their appointment to the year they were licensed and to the date of their graduation?

The significance of the study lies in the fact that Ohio was one of the first states to cease placing reliance upon the township, village, and city subdivisions of government as the units of public health organization. In 1919 the General Assembly passed a law, the Hughes-Griswold Act,[1] which divided the local subdivisions of the state into three possible units for public health administration—the city health district, which embraces all cities in the state[2]; the general health district, which embraces all townships and villages in each county (referred to here as county districts); and a union of two general health districts or a general health district and a city health district located within such district[3] (referred to here as combined districts). This law became effective January 1, 1920. These are the crude figures serving as background material with which the public health organization in Ohio has to deal.

Now what has happened in the administration of this organization in the 10 years which have elapsed from 1920 to 1929?

NUMBER OF HEALTH DISTRICTS

In 1920 there were created 168[4] health units, 88 of which were general, and 80 city health districts. These replaced the former system in which there were 2,158 independent health districts divided into 80 city, 727 village and 1,351 township units.

Each of these 168 health units had a board of health and each was required to employ a health commissioner, who had to be a licensed physician in the general health district but was not required to possess any qualifications in a city health district.

NUMBER OF HEALTH COMMISSIONERS

Analysis of the number of health commissioners in Ohio by type of service in 1920 and in 1929 is shown in Table III. In 1920 there was a total of 37 full-time and 129 part-time health officials in the three types of districts, while in 1929 the corresponding figures are 63 and 103.

The trend in both city and county units is definitely toward employment of full-time health commissioners and

* Based upon a study made by John A. Ey, Jr., and presented to the Ohio State University in partial fulfillment for the degree of master of arts in the School of Social Administration, 1932.

TABLE I

BASIC DATA FOR OHIO 1920–1930

The Basic Demographic Data for Ohio in the Decade 1920 to 1930

Year	Population	Area Sq. Miles	Persons Per Sq. Mile	Number of			Per Cent	
				Counties	Cities	Villages	Urban	Rural
1920	5,759,394	40,740	141.4	88	94	725	63.8	36.2
1930	6,646,697	40,740	163.1	88	110	752	67.7	32.2

a combined unit as the basic unit in administrative service.[5]

AGE OF HEALTH COMMISSIONERS [6]

The average age at appointment in 1920 was 44.3 years for full-time and 51.5 for part-time county districts; 48.0 years for full-time and 50.6 for part-time city districts; 43.2 years for full-time and 59.0 for part-time combined districts, while in 1929 the corresponding figures are 47.0 and 46.6; 42.5 and 30.6; and 39.0 for full-time combined districts.

Health commissioners appointed in the earlier years 1920 and 1921 were in the higher age groups while in the ensuing years, especially since 1926, the tendency has been to appoint younger officials. This is more true in the cities and combined districts than in the counties.

LENGTH OF TENURE OF HEALTH COMMISSIONERS

The data show that more officials served the entire 10-year period 1920–1929, than for any other number of years in the one office—20.2 per cent in the counties and 18.7 per cent in the cities. The average length of tenure for the three types of districts of the full-time officials is 4.9 years in the counties; 4.3 years in the cities and 4.0 years in the combined districts; of the part-time officials 4.9 in the counties; 5.1 in the cities. There were only 2 part-time officials in the combined districts so their experience cannot be compared with the two other types in this classification.

SALARY TRENDS

The group with the most officials within its limits received $4,000 to $4,500. The full-time officials in the counties and cities predominate in this class. Salaries of officials in the cities, both full-time and part-time, are rather low, 84.9 per cent under $2,500. In the counties 82.3 per cent received less than $3,500. In the three types of districts a total of 96.6 per cent received less than $3,500. In only one group,

TABLE II

BASIC VITAL STATISTICS DATA FOR OHIO 1920–1930

Year	No. Deaths All Causes	Death Rate per 1000	No. Births	Birth Rate per 1000
1920	73,846	12.7	124,303	21.4
1930	75,500	11.4	117,611	17.6

TABLE III

NUMBER OF HEALTH COMMISSIONERS 1920 AND 1929

Year	County			City			Combined		
	F. T.	P. T.	T.	F. T.	P. T.	T.	F. T.	P. T.	T.
1920	28	49	77	4	79	83	5	1	6
1929	26	45	71	18	57	75	19	1	20

(F.T.—Full-time; P.T.—Part-time)

those serving full-time in the counties, does the average salary for each year show a steady increase.

QUALIFICATIONS

The fact that by law all county health commissioners must be licensed physicians sets up uniform educational qualifications. Of the total of 83 full- and part-time officials in 1920 in cities, 61.4 per cent were licensed physicians. In 1923 this figure rose to 67.9 and in 1925 to 75.6. Physicians predominate among the health commissioners in cities since less than one-third were not licensed physicians. This has been found to be the case in other states as well as Ohio.[7]

Additional professional qualifications such as special university training in public health is so seldom encountered as to be negligible.

YEAR OF APPOINTMENT

The figures showing the relation of the year the officials were appointed to the year they were licensed as physicians and to the date of graduation from medical college reflect the tendency toward appointment of young commissioners in the cities. This is true especially since 1926. In the counties, however, since 1925 the trend has been to appoint officials in the older age groups.

CONCLUSIONS

The study covering the 10-year period 1920–1929 shows a definitely increased trend toward the employment of full-time health commissioners; there is a tendency toward the establishment of combined units of organization including the general and city health districts in a single administrative unit; the age of officials at appointment is in the direction of the younger age groups, 30 to 50; the salary level is low with the trend downward rather than upward; and about the only educational and professional qualifications required are those which are embraced in the general term "licensed physician."

Before public health administration in Ohio can be said to have reached a professional rather than an apprentice status it is evident that several fundamental principles must be established. There must be assured a sufficient tenure of office—not less than 5 years and preferably 7 years; a salary scale graded commensurately with the type and composition of the unit organization; a recognition that a public health administrator should have special university training similar to that required of our school administrators; a clearly defined set of qualifications beyond the blanket term "licensed physician" needs to be established to enable the tax payers to form judgments on this

point; and increased opportunities for special training should be afforded prospective public health administrators in our universities throughout the state.

REFERENCES

1. **Laws** of Ohio 1919, Vol. 103, Part 1, pp. 236–251.

2. A city in Ohio in contradistinction to the definition of the U. S. Bureau of the Census, Department of Commerce, is defined in the State Constitution, Article XVIII, Sec. 1: "Municipal corporations are hereby classified into cities and villages. All such corporations having a population of 5,000 or over shall be cities; all others shall be villages. The method of transition from one class to the other shall be regulated by law (adopted Sept. 3, 1912).

The regulation provided by law is that "municipal corporations, which, at the last federal census, had a population of 5,000 or more, shall be cities. All other municipal corporations shall be villages. Cities which, at any future census, have a population of less than 5,000 shall become villages. Villages which, at any future federal census, have a population of 5,000 or more, shall become cities" (96 v. 20, p. 1) (Section 3497, Page and Adams Annotated Ohio General Code, Vol. 2, p. 3).

3. Subsequent amendment provided for a union of a city health district and a general health district or *vice versa*. (Laws of Ohio, 1931, Vol. 114, pp. 114-115.)

4. One general health district covering a small rural county without a city in it has never been organized permanently under the present law.

5. For the annual tabulations in this phase of public health work see Reprints from the *Public Health Reports* by the U. S. Public Health Service from 1912 to date.

6. See discussion on this point "Ages of Health Officers in Relation to Professional Training." John A. Ferrell, M.D., Dr.P.H., and Pauline A. Mead. *A.J.P.H.*, XXII, 9:904–908 (Sept.), 1932.

7. Report of the Committee on Municipal Health Department Practice. *Pub. Health Bull. No. 136*, July, 1923, Table 8, p. 28.

Milk and Growth

1. The influence of the addition of milk to the diet of school children is reflected in a definite increase in the rate of growth both in height and weight.

2. There is no obvious or constant difference in this respect between boys and girls, and there is little evidence of a definite relation between the age of the children and the amount of improvement. The results do not support the belief that the younger derived more benefit than the older children. As manifested merely by growth in weight and height the increase found in younger children through the addition of milk to the usual diet is certainly not greater than, and is probably not even as great as, that found in older children.

3. In so far as the conditions of this investigation are concerned, the effects of raw and pasteurized milk on growth in weight and height are, so far as we can judge, equal.—Leighton and McKinlay (1930), Dept. of Health for Scotland. Milk Consumption and Growth of School Children. *Report of an Investigation in Lanarkshire Schools.*

Industrial Dermatitis in the United States*

LOUIS SCHWARTZ, M.D.
Senior Surgeon, U. S. Public Health Service, New York, N. Y.

IN some countries, especially England and Germany, more attention has been paid to industrial dermatitis than in the United States. Since the promulgation of Workmen's Compensation Laws, the problem of industrial dermatitis has become of greater importance than ever in this country. Industrial dermatitis or occupational eczema contributes about 50 per cent of all claims for compensation due to conditions classified as industrial diseases. Even this does not represent the real incidence of occupational eczema because the majority of cases of industrial dermatitis do not incapacitate the worker, and only those workers put in claims for compensation who must stay away from work for one week or longer.

In our inspection of plants, we noted workers at their jobs affected with varying degrees of occupational dermatitis. Most of these cases were not reported, either because they were not serious in nature, or because the workers feared that a claim for compensation might militate against their retaining their positions. There were a few severe cases of dermatitis in men who were working because the compensation they might receive was less than they could earn.

We found some workers not reporting their condition because other workers had told them that many new employees were affected in the same way, and that if they kept on with the work, they would become hardened and no longer be troubled.

FREQUENCY OF OCCURRENCE

Skin diseases are associated with many occupations, the rubber industry causing rubber itch, tanning of leather chrome sores, oil refineries oil acne, dyeing establishments dye dermatitis, etc.

The amount of industrial dermatoses reported by the hospitals is very small. In one hospital in New York where there are over 20,000 new skin cases treated a year, there were only 53 cases per year of industrial dermatitis; in another having 5,000 new skin cases per year, only 5 cases per year of industrial dermatitis. In a private industrial clinic servicing various manufacturing establishments in Greater New York, out of 33,000 cases of all kinds treated over a period of one year, there were 103 cases of dermatitis.

According to statistics gathered from the States of New York, Missouri, Connecticut, Massachusetts, Wisconsin and Ohio, of 19,428 occupational diseases reported during the period covered by the records, 9,621 were occupational dermatitis, or about 50 per cent. In these states there was an average of 2,944 cases of occupational dermatitis per year—an annual rate of 48 per 100,000 of the industrial population.

* Read before the Industrial Hygiene Section of the American Public Health Association at the Sixty-first Annual Meeting in Washington, D. C., October 26, 1932.

These include only the more severe cases of dermatitis, and it is safe to say that if the minor cases which are not reported, or which are not disabled for a period of one week or more, were counted, it would be shown that there are many times this number of cases actually occurring per year in the United States.

CASES FOUND IN THE PRESENT STUDY

In the present study the industries examined were selected at random and not because of any undue prevalence of dermatitis. They included dyeing establishments, rubber works, oil refineries, candy makers, linseed oil works, and chemical manufacturing. Out of 18,567 workers examined, there were 285 occupational skin diseases found, a rate of prevalence of 1½ per cent.

CAUSATIVE AGENTS OF INDUSTRIAL DERMATITIS

The chief causes of industrial dermatitis differ in the various localities according to the prevailing types of industry present.

In New York State of 232 industrial dermatitis claims about 26 per cent were due to general irritants, such as acids, alkalies, chrome and turpentine, 13 per cent were due to plant and vegetable poisoning and 10 per cent were to dyes. Gasoline, benzine, oil and naphtha account for about 10 per cent.

In Missouri out of 1,020 cases, 69 per cent were due to lime and cement, 6 per cent to lye, 15 per cent to poison ivy, 1½ per cent to petroleum and 9 per cent to caustics and sulphuric acid.

In Wisconsin in the past ten years, of 1,909 cases of dermatitis, 17 per cent were due to toxic vapors, 42 per cent to toxic fluids, 20 per cent to irritating dusts and 15 per cent to poisonous dusts.

In Ohio, irritating dusts associated with the rubber industry have led the list of causes of industrial dermatitis. Oils and cutting compounds, including lubricants, have been a close second, and at the present time, according to Dr. Hayhurst, undoubtedly lead the procession of skin irritants.

From these statistics, it can be stated that the majority of occupational skin diseases in these states are caused by acids, alkalies, caustics, oils, greases and solvents.

Plant poisoning by ivy, oak, sumac, primrose and wood dusts occurring among florists, gardeners, and carpenters, constitute a considerable percentage of cases of occupational dermatitis. In New York State out of 449 cases, 14 per cent, and in Ohio, out of 4,600 cases, over a 5-year period, 2 per cent were due to this cause.

COMPENSATION FOR INDUSTRIAL DERMATITIS

Only 11 of our states compensate for industrial skin diseases. The compensation laws in these states are not all the same. Some compensate for any occupational disease arising out of and in the course of employment; others specifically name the causative agent. Dermatitis is not specifically mentioned in some while in others the causative agents for which occupational dermatitis is compensated are named.

What is reportable or compensable in one state may not be so in another. This makes it very difficult to compile reliable statistics from the records.

CLASSIFICATION OF CAUSES OF OCCUPATIONAL DERMATITIS

To give a list of substances causing industrial dermatitis would be to give a list of almost every known chemical or substance, because idiosyncracy or hypersensitivity or allergy can be developed towards almost any substance. The causative agents can be classified in various ways. One manner is as follows:

1. Physical Agents—such as heat and cold, radiation, etc.
2. General Irritants—such as acids, alkalies and caustics, etc.
3. Specific Irritants—These do not affect everybody but cause skin rashes in a considerable percentage of people. Such are paraphenylenediamine, hexamethylenetetramine, benzine, and certain oils and plants.
4. Fat Solvents—These act by dissolving the fat and oil from the skin and making it more sensitive to irritation.
5. Dehydrators — Crystalline substances which act by absorbing the moisture from the skin, such as salt and sugar.
6. Biologic Agents—Bacteria and pathogenic fungi.

Then there is a group of substances which affect only the skins of hypersensitive people. If these are met with at the place of employment, then the dermatitis is an industrial dermatitis due, partially to the substance and, partially, to the hypersensitivity of the individual.

There is still another group of people who, at first, are not sensitive to the materials with which they work, but after exposure to them for varying lengths of time, become sensitized or allergic and develop a dermatitis. These allergic forms of occupational eczema are related to hay fever, asthma and serum sickness.

CLINICAL FORMS OF OCCUPATIONAL DERMATITIS

Occupational dermatitis is, in its acute form, a dermatitis venenata, and does not have any characteristic appearance except when caused by a few substances such as arsenic and poison ivy.

Fat solvents cause the skin to become dry and cracked, and dehydrators give a parchment-like, scaly appearance. Aside from the few general characteristic appearances caused by a few skin irritants, the appearance of the skin gives no clue to the irritant causing the condition.

Occupational dermatitis in its acute stage is characterized by erythema, edema, papules and vesiculation of the exposed parts. Other parts of the body may also be affected, especially when the clothes are penetrated by the offending material. Later on crusting and desquamation may occur. Complications such as pus formation and parasitic infections may entirely change the picture of the original disease.

The first attack of occupational dermatitis may disappear while the person is working and it may never appear again. It may disappear after the person stops working and not appear again upon resuming work, or it may disappear upon stopping work and reappear when resuming the work, or it may become chronic with acute exacerbations.

It is characteristic of a typical occupational dermatitis that it appears when the person is exposed to the offending substance, disappears after the exposure has ceased and reappears when the person is again exposed. This is a classical picture and is not always met, because other conditions complicate the matter.

There are some people who, when they first begin work, develop a mild dermatitis which, after a while, disappears, leaving them immune. There is another class in whom the dermatitis develops in so severe a form that it necessitates staying away from work, and when they return to work the condition reappears. Such people are likely to discontinue that occupation of their own accord. There is still another class who develop an immunity while working but this is short lived, and if they discontinue working for a week or two, then come back to work, they again contract the dermatitis and again may develop an immunity. In other words, continuous exposure among such people develops an immunity which lasts a short time.

Some workers have alternating re-

missions and exacerbations of dermatitis while at work. These cases are difficult to explain. It may be possible that the conditions under which they work are not constant although they appear to be. The dermatitis itself may exhibit a periodicity due to variations in the resistance of the patient or to variations in his sensitivity.

There is still another group of cases described by Rudolph L. Mayer, in which the primary dermatitis is followed by frequent relapses and, finally, a chronic condition persists even after elimination of the offending substances; that is after giving up the employment. Mayer explains that in these cases there gradually develops a nonspecific polyvalent sensitivity of the skin to many things that are encountered in the course of daily life. Secondary infections with pus organisms and molds may also take place in these cases, and the resultant sensitivity may complicate the disease. It is very difficult in such cases to prove that occupation was the original cause of the condition.

DIAGNOSIS OF INDUSTRIAL DERMATITIS

In making examinations of workers, many skin conditions such as psoriasis, lichen planus, impetigo, scabies, etc., were found which had no relation to the occupation. In making a diagnosis of industrial dermatitis, it must be determined whether or not the man is exposed to a general irritant, and if he is, whether the eruption developed before or after beginning the occupation. If there is no exposure to a general irritant, it must be determined whether there is a sensitivity to any of the materials with which the person comes in contact in the course of his employment. This can be done by means of patch tests, applied as follows:

Eight thicknesses of gauze ½ inch square are saturated with the material suspected of causing the dermatitis, and placed on a clear portion of the skin. It is best to select, if possible, a clear portion of skin immediately adjacent to the eruption on the theory that the portion of the skin nearest to the eruption is most sensitive to the chemical. The gauze is covered by a piece of dental rubber about 1 inch square so as to keep in the moisture. This is covered by a piece of cotton flannel about 1½ inches square, in order to keep in the heat, and covered with a piece of adhesive plaster 2 inches square. The patches may be removed at the end of 24 hours and the skin underneath inspected. If the skin is sensitive to the material, there will be a reaction varying from an erythema designated as +; to an erythema with edema designated as ++; erythema, edema and vesiculation, designated as +++; to an erythema, edema and ulceration designated as ++++.

In cases where materials are used which are innocuous to a normal person, the patch may sometimes be left on for as long as five or six days in order to obtain the reaction. Care must be exercised in doing patch tests with general irritants. If hypersensitivity to dilute solutions of these materials is suspected, then such dilutions of them are to be used as will not ordinarily affect the normal skin. For instance, a 1 per cent solution of potassium bichromate has been found not to affect the non-sensitive skin but does produce a reaction in people sensitive to chromium. In the case of turpentine sensitivity, 1 part of turpentine to 9 parts of olive oil may be used. I have found cases in the candy industry so sensitive to the oil of cinnamon that a solution of 1 drop of oil in 49 drops of olive oil produces a marked reaction after 24 hours.

In doing patch tests, it is best to have controls, using an individual who is doing the same work as the patient but who shows no skin eruption. A blank control patch or one with some other

substance can also be used. Sometimes there is no reaction found under the patch when taken off, but a day or two later a reaction develops at the site of the patch. These are called delayed reactions and also indicate a hypersensitivity.

Patch tests, if properly done, are reliable in showing either acquired or natural hypersensitivity. If they do not give positive results, intradermal tests similar to those done for asthma may be tried, but these are of less diagnostic value.

EPIDERMOPHYTOSIS AS AN OCCUPATIONAL DISEASE

Fungus infections and epidermophytids offer a serious problem in the diagnosis of industrial dermatitis. It is often very difficult to say whether the condition is due to a man's occupation or not.

In our inspection of the workers in the various plants, we often came across cases of fungus infection of the hands and of apparent allergic reactions called epidermophytids or tricophytids on other parts of the body due to absorption of substances from the localized fungus infection. These were, in many instances, wrongly diagnosed as occupational dermatitis. There are, however, certain occupations which predispose to fungus infections because, during the course of employment, the person is exposed to pathogenic fungi or because the skin becomes moist, hot and macerated, and forms a favorable site for the growth of fungi. Barbers and bathhouse attendants are examples in which there is a special exposure to the action of fungi, and among them fungus infections of the hands, feet and nails are often seen. Among stokers, firemen and men who work in rubber vulcanizing pits, there develops, on account of heat and moisture, a soggy condition of the skin in the interdigital spaces, and this favors the development of fungi. We have also found an unusual prevalence of tinea of the hands and feet among workers with raw wool.

CANCER AND OTHER GROWTHS IN INDUSTRY

Certain industries predispose to the development of carcinoma. Carcinoma of the bladder occurs with unusual frequency among workers in synthetic dyes. Arsenic has also been blamed as a cause of cancer. We are all familiar with the carcinomatous degeneration taking place in X-ray and radium burns among physicians and technicians handling X-rays and radium. Cancer of the scrotum among chimney sweeps in England has been known for many years, and a similar condition has been discovered among arsenic smelters.

In workers in some of the oil refineries in this country, we have noted carcinoma of the cheek and of the lip, and among paraffin pressmen, of the hands and of the scrotum. We have also noted an unusual prevalence of small, flat, pigmented papillomata on the dorsum of the hands, the forearms and legs of workers in oil refineries and among machinists and mechanics who handle oils and greases. More than 10 per cent of such workers were found to have these growths.

Among mule spinners in England there is reported an unusual prevalence of carcinoma, but in a large woolen mill in this country, we found no cases of carcinoma. It may be that the oil used in softening the wool in this country is different from that used in Europe. The factory in which our examinations were made used vegetable oil.

PREVENTION OF INDUSTRIAL DERMATOSES

The ideal prevention would be so to safeguard the industries which are dangerous that the injurious chemical could not come in contact with the skin of the worker. This is impossible in a

great many cases. Protection of the worker against irritating substances such as acids, alkalies, caustics, etc., by the wearing of suitable rubber gloves and clothes will often keep down the number of cases of industrial dermatoses.

In factories where such irritating substances as the irritant dyes, paraphenylendiamine, etc., are used, or the rubber industry where certain irritants in the form of accelerators and antioxidants are used, patch tests may be done on applicants for employment to determine their susceptibility to the materials which they will be called upon to handle, and those found to be hypersensitive should be rejected. Those workers who become sensitized after a long period of occupation should be shifted to other departments.

In factories where the skin hazard is great, personal hygiene must be emphasized. Workers must take baths and change clothes before leaving the plant, and for this purpose adequate toilet and washing facilities should be provided. Supplying clean towels daily to workers in oils and greases with instructions to wipe the hands and arms frequently has, according to Dr. Hayhurst, kept down the number of cases of dermatitis. Chemists and engineers should constantly strive to substitute harmless substances for the irritants which are now used. The installation of proper ventilation, exhaust hoods, totally enclosed dust-proof and gas-proof units will, by allaying dust and fumes, play a large part in preventing the occurrence of industrial dermatoses. Protective ointments smeared over the exposed parts have, in some instances, been advocated.

TREATMENT OF INDUSTRIAL DERMATOSES

A person who is sensitive to the materials with which he works should seek some other occupation. Industrial dermatoses if uncomplicated will disappear when the person is away from the substance which has irritated his skin so that a cessation of work will usually cure the condition. If complications in such forms as suppuration or parasitic infection have set in, they must be treated and they may not be easily amenable to treatment. If a man must go back to his work after he is cured, he should be told to protect the parts by wearing long sleeves or gloves or by rubbing in protective ointment, as advocated by Dr. J. S. Millard of the Goodyear Rubber Company.

Desensitization by injecting minute quantities of the offending material underneath the skin has been tried but with no great success.

New synthetic chemical compounds are constantly being discovered and used in new industrial processes and many of these compounds are skin irritants. This constantly increases the industrial skin hazards and challenges the ingenuity of the sanitarian in devising preventive measures and cures.

LETTER TO THE EDITOR

To the Editor:

In *Community Health Organization*, 1932 edition, by Professor Ira V. Hiscock, there are certain figures and statements on present standards of laboratory work per 100,000 population which have recently been critically examined by the Council of the New York State Association of Public Health Laboratories. As a member of this Council I have been interested in comparing the standards offered with the actual experience in public health laboratories of New York State. While I fully endorse the introductory paragraph of the chapter on Laboratory Service, it is impossible to subscribe to what he offers as present standards of laboratory work.

The implications in this chapter are that a community can provide adequate laboratory service for 100,000 people by facilities to do 6,000 public health examinations a year. With the coöperation of others on the Council a table has been prepared, showing the experience in New York State for the last 3 years for which figures are available. From the recorded experience in this state it is quite clear that all of Professor Hiscock's figures are much too low, viewed either from the standpoint of representative urban or rural communities. Six thousand public health examinations a year per 100,000 population are only a fraction of the necessary work. It is unfortunate to have the erroneous impression go forth that a community of 100,000 people can on such a basis establish or maintain adequate laboratory service.

The accompanying table has been compiled so that the discrepancies between Professor Hiscock's figures and those recording the experience in New York State are made to appear as small as possible. Many essential public health examinations such as those in the diagnosis of poliomyelitis, amebic dysentery, septic sore throat, and laboratory examinations which are for clinical diagnosis and not, strictly speaking, a part of public health work, are not included in these figures because statistically they are grouped under "Miscellaneous." Of course, such a distinction is open to question.

Broadly considered, the public health work in any community is directly dependent upon and proportional to the standards of medical practice in that district, and early differential diagnosis of disease is an essential basis for safeguarding the public health even if considered only from the point of view of the control of epidemics and the spread of communicable disease. I have made no attempt to include any figures for laboratories not on the list of those approved in New York State, so that the statistics from these districts are conservative in that they probably do not represent the actual total.

The method of handling the figures has in another respect made the discrepancy between those in this book and the New York State figures less marked. Those in the table are for a 3-year average. During the period covered the increase has been about 27 per cent. If only the figures for 1931 were compared with Professor Hiscock's, the inadequacy of 6,000 examinations a year per 100,000 population would appear even greater.

Making all these allowances in favor of Professor Hiscock's estimate, it still seems clear that 6,000 examinations a year per 100,000 population are less than one-third of the number that

TABLE

	Public Health Exams. per 100,000 pop. (1) (a) (b)	Wassermann Exams. per 1,000 pop.	G. C. Smears per 1,000 pop.	Diphtheria cultures per resident deaths (c)	Tuberculosis Exams. per resident deaths (c)	Widals per resident deaths (c)
Prof. Hiscock's Estimate	6,000	20	3	250	6	80
New York State—Urban:						
Buffalo City Laboratories	41,490	193	23	714	34	73
Utica " " (e)	21,008	102.6	26.6	1,076	12.8	157
Albany " " (f)	20,151	82	34	564	22	156.9
Syracuse " "	38,672	159	40	4,474	24.7	544
New York State—Rural:						
Tompkins County Lab. (g)	12,166	75	8.5	(rate: 0 (exams: 330	11.6	167
Otsego " "	11,100	61	8	631	17	1,074
Cattaraugus " "	25,241	59	7	348	24	513
New York State—Rural and Urban:						
Monroe County Lab. and Rochester City Labs.	28,348	178	13.7	2,246	15	355
Total New York State Exclusive of New York City	19,132	88.6	13	801 (d)	21 (d)	135 (d)

(1) "Public Health Examinations": Figures used do not include such examination as Throat Cultures for predominating organisms, spinal fluids, stools for ova and parasites, urines, etc., which might have been public health work but which are statistically grouped under "Miscellaneous" in the Annual Report of the Division of Laboratories & Research. Neither have we included examinations done by laboratories approved only for milk and water tests, such as dairy company laboratories.

(2) Sources of information:

(a) Actual figures of tests done in above laboratories taken from annual reports submitted to the Division of Laboratories & Research, New York State Dept. of Health, using an average of 1929, 1930, and 1931 figures.

(b) Population figures taken from U. S. Census, 1930.

(c) Figures for resident deaths secured from Division of Vital Statistics, New York State Dept. of Health. An average of 1929, 1930, and 1931 rates was used.

(d) Resident deaths for year 1930 used.

(e) Examinations done at Utica State Hospital not included.

(f) Examinations done by Division of Laboratories & Research (State Lab.) not included.

(g) Examinations done at Clin. Lab. Medical Adviser's Office, Cornell Univ., not included.

Note: Total public health examinations done in above urban and rural laboratories increased 26.9 per cent from 1929 to 1931. The 3-year average used in above calculations therefore gives in most cases a lower figure than that which existed in 1931 or 1932.

The laboratories of Tompkins, Otsego, and Cattaraugus Counties were selected as most representative of the purely rural districts where only the county laboratory operated and where there are no large cities.

present standards and an adequate health program demand. In this connection a recent survey by the New York State Association of Public Health Laboratories in New York State showed that in many localities the physicians fail to use the laboratory facilities as much as they should. Hence, the New York State figures are smaller than a really adequate public health program requires.

A second point requiring comment is the implication in the chapter on public health laboratory service that a trained pathologist as director of the public health laboratory is unnecessary. He states that the chief of the laboratory service should be a bacteriologist, and the inference, I take it, is that the director need not be a graduate in medicine. Again the experience in New York State, in the

opinion of many who have observed the workings of public health laboratories, is at variance with this point of view. One of the most useful functions of a director of a public health laboratory is to coöperate with practising physicians in a consultant capacity and to disseminate information on all types of laboratory procedures. These contacts and the correlation of the clinical aspects of public health work and laboratory diagnosis can be achieved far more successfully if the director of the laboratory is a graduate in medicine who has been trained in pathology. The experience in New York State appears to have demonstrated that a population of 100,000 people should have a public health laboratory under the direction of one of great experience and wider point of view than a bacteriologist without training in medicine.

From the foregoing it obviously follows that Professor Hiscock's budget allowance is also inadequate. Accurate figures of the experience, from the budget point of view, of the laboratories in this state are not readily available, but the inadequacy of the budget given by Professor Hiscock for a laboratory in a community of 100,000 is only a little less than that of his figures for the number of examinations.

Note: If the figures for "examinations" in Hiscock's book refer to specimens submitted for examination and not to the laboratory tests performed, the validity of the criticism offered in this communication is unaffected. The New York State figures given in the accompanying table are for "examinations." Only in the case of the complement-fixation test for syphilis is there much difference between the figures for "examinations" and those for "specimens" and here the percentage difference is less than 100. In all the other tests included in the table the difference between "examinations" and "specimens" is trivial.

G. M. MACKENZIE, M.D., *Director,*
Otsego County Laboratory,
Cooperstown, N. Y.

TYPHOID CASES AND DEATHS IN NEW YORK STATE

A CORRECTION

IN a recent advertisement prepared by Wallace & Tiernan Co., Inc., and published in this *Journal,* there appeared a reproduction of an Associated Press item which said: "Since 1928 there have been 10,000 fewer deaths and 100,000 fewer cases of typhoid fever than if the 1928 level of the disease had prevailed."

Obviously the Associated Press report was at variance with the facts, as there were only 209 deaths from typhoid fever in New York State in 1928.

We are informed that the statement should have read 1906 and are asked by the advertisers to offer this explanation and to clear the New York State Department of Health of any responsibility for the erroneous statement.

EDITORIAL SECTION

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ENCEPHALITIS IN ST. LOUIS

THE epidemic of encephalitis in St. Louis, Mo., is the major medical event of the year so far. While attention was called to some cases about the third week in August, there is evidence that they began late in July. At the present writing, 475 cases, with 71 deaths, have occurred; but of course these figures are good only for the time of writing. The mortality has been about 14 per cent.

There have been cases of encephalitis lethargica in St. Louis in 1919, 1924, and 1932, but the present outbreak is by far the most serious which has occurred. It bears little resemblance to the classic disease described by Economo in 1916 and 1917 in Vienna, but is much more like that on the Inland Sea of Japan in 1924,[1] which was similar to that seen in Australia in 1917–1918, and called there the "Mysterious X-disease." The death rate in Australia reached 70 per cent. The present epidemic differs from that, in which 50 per cent were under 5 years of age, in that the great majority of cases are over 15 years—only 19 per cent being under this age—and the case fatality is greater in the higher age groups—35 years and above. Japan has experienced 13 outbreaks, one of which in 1873, though limited in extent, showed a mortality of between 80 and 90 per cent. The largest epidemic in Japan was in 1924, which came on suddenly, showing a large number of cases in widely separated areas almost at the same time. Some 7,000 cases occurred, with a death rate of 60 per cent, 66 per cent of which were over 40 years of age, and 34 per cent under that age. Two smaller epidemics have occurred in Japan since that time, in 1925 and 1929, the last with a death rate of 65 per cent.

The epidemic in St. Louis corresponds more closely to the Japanese type as described than any other of which we know, yet there are many cases which do

not correspond with this type, and it is not too much to say that not only the profession in St. Louis, but the officers sent there from Washington by our Public Health Service are puzzled over the situation, and are not prepared to make dogmatic statements. The epidemics in Japan showed a tendency to reach their peak about the last week in August. The great epidemic of 1924 occurred in a summer which was unusually dry and hot, which is true of St. Louis also, the summer having been the driest since 1837.

St. Louis offers a situation which is unique in some respects. The city is credited with 1,200,000 inhabitants. The city proper has not enlarged its boundaries since 1876. Whenever expansion became necessary on account of the increase in population, municipalities have been founded in suburban areas around it. There are upwards of 20 such municipalities, each having its own separate government, yet one does not know when he is in a suburb and when in the City of St. Louis. These groups, which are politically separate entities, correspond to what would be generally called outlying wards. The drainage problem has been acute. The river Des Peres has been used as a common sewer, and whenever the wind is in the right direction the stench is observed in the city. All of these outlying municipalities drain into some such stream, the majority into the river mentioned, which is at best little more than a creek.

The mosquito situation this year is extreme. There have been four dry years in succession, and the present summer has been excessively dry, only one really heavy rain having occurred since June. The result is that this common sewer is unusually foul. According to the testimony of an expert from the Public Health Service, an ordinary tumbler full will contain from 5,000 to 8,000 mosquito larvae. The Health Officer states that anywhere along this stream where there is a quiet place, one may dip up a mixture which is three-fourths larvae and one-fourth water—as he expressed it, "a living soup of larvae." Of course attempts have been made to connect the sewage situation with the outbreak, so far without any success or apparent good reason; but other lines of research have been equally abortive. However, as a matter of precaution, all patients in hospitals are screened.

So far, approximately two-thirds of the cases have occurred in what is called St. Louis County, embracing the various municipalities referred to, and one-third in the City of St. Louis. In the business section where comparatively few people reside, there have been few or no cases. The section of the city occupied by thrifty people of German descent has been practically free, as has also University City, which corresponds to this in thrift and cleanliness. There have been only 14 cases among the Negroes who form 12 per cent of the population, although the housing in the section occupied by them is perhaps the poorest anywhere.

In only four instances is there positive evidence of 2 cases having occurred in the same house. In one, a nurse and a child were stricken simultaneously, pointing to a common cause, rather than to contact one from another. The experts studying the situation all admit that there are many more cases than have been reported, which one would expect. There have also been many cases not diagnosticated as encephalitis, which when looking backward would probably be classed as mild or abortive cases of the disease.

One striking feature of the outbreak is that the patients who do not die get well quickly, in some cases, as a neurologist connected with one of the hospitals in the city says, "miraculously so." It is, of course, too early to speak of subsequent damage to the nervous system. Some effects may appear, as they have in

other epidemics, after several months, but at present, complete and even rapid recovery seems to be the rule.

Post-mortems have been done on all patients who have died. The lesions found so far are of the same nature, but at a higher level and more diffused than usually found in lethargic encephalitis. The cortex is involved and there is no tendency toward a localization in the central nervous system such as the basal ganglia and the brain stem. Many cases show a marked inflammation of the kidney with rather diffuse hemorrhages.

The incubation period seems to be 5 to 12 days, and the onset fairly sudden—in many cases extremely so.

The U. S. Public Health Service has been invited into the city. Already seven officers have been there and four more have been ordered to report. The Federal Treasury Department has granted $25,000 for a study of the disease. Senior Surgeon J. P. Leake has been in charge of the epidemiological study. Dr. George W. McCoy, Director of the National Institute of Health, has been there for some days in a consulting capacity. Dr. L. L. Williams, who is in the plague unit of the Public Health Service, and has been trained as a mosquito man, has made a survey of the territory and, more recently, Dr. Cornelius B. Phillip, an entomologist connected with the Rocky Mountain Spotted Fever Laboratory in Hamilton, Mont., has arrived. Those recently ordered include laboratory experts, epidemiologists and special research men. The Health Department of the city is under the competent management of Dr. J. F. Bredeck, with Dr. P. J. Zentay as Assistant Health Commissioner.

Needless to say, the school situation has attracted much attention. The schools in St. Louis have opened on schedule September 5, with some 95,000 enrollments. The various colleges throughout the state will also open as usual, though there is some alarm being shown by those who have enrolled, and some are cancelling their reservations.

No cases have been reported from central Missouri, but some 45 have occurred in the neighborhood of Kansas City. A house-to-house canvass will be made, and it is to be hoped that the opportunities for study will clarify some of the problems connected with encephalitis in general. It remains to be shown whether the various epidemics considered, as well as the one at present in St. Louis, are due to distinct etiological entities, or can all be referred to a single causative agent, at present unknown, as is the mode of transmission, though personal contact seems now to be the most important factor.

NOTE: At the present time, September 21, the epidemic shows signs of decline. Total cases number 910, deaths 160—in the City, 428 cases and 83 deaths; in the County, 482 cases and 77 deaths.

VITAMIN D MILK AND THE HEALTH OFFICER

THE progress of science often creates new administrative problems for public health officials. The development and increasing popularity of "Vitamin D Milk" is an example, for the widespread use of this desirable antirachitic has raised important questions as to its most effective control by health officers and food and drug officials.

Although vitamin D milks have been on the market for only about two years,

they are now distributed in more than 100 cities in 20 states.[1] At first such biologically activated milks were confined to certified milk and were produced under rigidly controlled scientific conditions by those who conducted the research work and developed the products. Later, other certified and Grade A pasteurized milks were properly included, but now a few dealers are offering lower grades of milks with increased vitamin D potency.

Since the primary function of these biologically activated milks is to supply vitamin D in sufficient quantities to prevent and cure rickets in infants and young children, it is obvious that only milks of known high sanitary quality and low bacterial content should be used for this purpose. The utilization of possibly inferior quality milks, with relatively high allowable bacteria contents, as carriers of vitamin D is, in fact, usually done for mercenary and competitive purposes, and not as a contribution to public health. For these reasons, such milks should not be tolerated.

Three methods for the production or preparation of vitamin D milk are now in operation. The first and most widely employed is a natural method, in which irradiated yeast is incorporated in adequate amounts in the feed of cattle. By the proper use of this system, fluid milk is obtained with an entirely satisfactory vitamin D potency, sufficient to cure rickets when from 20 to 24 ounces are consumed daily. This method is best carried out on large farms having proper technical facilities, since intelligent and competent supervision is required.

The second method is by the carefully controlled direct irradiation of the fluid milk by carbon arc lights of proper strength. Here again, careful supervision by experts is necessary. This process may be compared to pasteurization as a treatment of milk, a desirable process which is a necessary factor in disease prevention. According to Hess,[2] irradiation of fluid milk provides the most desirable antirachitic for the community prevention of rickets, a malady which is now much too prevalent in this country. This method is in operation in Detroit, but has not yet been adopted in other cities, although a well known brand of dried milk made from irradiated fluid milk has been on the national market for several years.

The third method is by the addition of a concentrate of cod liver oil to milk. The concentrate is supplied to milk dealers who are instructed as to the proper ways of adding it, and a considerable number of dairymen have been licensed to use this system. As pointed out in the report of the Committee on Milk and Dairy Products,[3] such a vitamin D milk is a modified milk and should be labelled as such. Some authorities have characterized this process as an adulteration of milk. As in the cases of the other two methods, intelligent technical use of this system is required.

From the standpoint of control, one important duty of health and food and drug officials is to make certain that all alleged vitamin D milks are always actually potent in the antirachitic substance, and this is also true of the medical milk commissions under whose certification products labelled "Vitamin D Certified Milk" are dispensed. Another duty is to require proper labelling of these products, but at present this is a rather complicated matter and might cause misunderstandings due to the methods of bio-assays and the potencies of milks produced or prepared under the several methods. A third duty is to make sure that the milks themselves are of acceptable sanitary quality.

The average health official does not have facilities for bio-assays of the vitamins in milk. These can be made only in properly equipped bio-chemical laboratories, such as exist at large universities and at some agricultural experi-

ment stations. The bio-assays should be made routinely every two or three months in the case of "yeast" milk, and possibly oftener for the other types, especially if there seems to be any fluctuation in results. Recording devices analogous to temperature control for pasteurizing machines, are being developed for irradiation processes and will serve as effective aids to control officials.

To date no scientific evidence has been advanced to show that there is danger from an excess of vitamin D in these milks, but there may be a hazard from lack of it. If the proper potency is not maintained, physicians and consumers who rely on them as antirachitics will be defrauded and public health will suffer. According to Hess,[2] an intake of from 20 to 24 ounces of irradiated milk containing from 50 to 56 rat units of vitamin D to the quart is satisfactory; "yeast" milk should have not less than 90 units; while cod liver oil must possess at least 250 units to be effective; and viosterol requires from 600 to 800. From these facts, it is obvious that the irradiated and "yeast" milks have certain advantages as antirachitics, especially since they are also the best dietary sources of the necessary minerals, calcium and phosphorus.

The labelling of all milks may be governed by local statutes and regulations, but the vitamin D milks should be specially labelled to show exactly what they are, and this labelling should be permitted only if potency is demonstrated. As a temporary expediency it may be suggested that as a natural milk supply, the "yeast" milk may be designated only as "Vitamin D Milk." Irradiated milk should be so labelled, with the added phrase "Vitamin D Milk," but that made by the use of a concentrate should be designated as a milk so modified. Statement of rat units or potency on labels apparently is impracticable at present. The actual grade of the milk, such as "Certified," "Grade A," etc., should also appear on the label.

Since the appearance on the market of the first vitamin D certified milk in the summer of 1931, many scientific investigations have been conducted on this type of milk and many contributions have been made to the literature on the subject. A number of valuable papers on vitamin D milk have been published in this *Journal*,[4] while the subsequent literature has been mentioned in the recent brilliant paper by Hess.[2] Health officials in communities where vitamin D milk is now or is about to be distributed, should familiarize themselves with all of this valuable material, and they should be prepared to exercise zealous surveillance over these special milks, the proper use of which can do so much to promote the public health.

REFERENCES

1. Tobey, J. A. Vitamin D Milk. *Hygeia*, Aug., 1933.
2. Hess, A. F. and Lewis, J. M. An appraisal of antirachitics in terms of rat and clinical units. *J.A.M.A.*, 101:181 (July 15), 1933.
3. A.P.H.A. *Year Book*, 1932–1933, p. 82.
4. *A.J.P.H.*, Dec., 1932; Jan., 1933; Mar., 1933.

ASSOCIATION NEWS

ENTERTAINMENT AND INSPECTION TRIPS

INDIANAPOLIS

THERE will be feast for the mind and satisfaction for the soul for four days beginning October 9 when the American Public Health Association meets in Indianapolis.

The Entertainment Committee is planning a series of trips to interesting points, and occasions when the seriousness of the meetings may be set aside for lighter diversion. At 10:00 A.M. on Monday an inspection trip to the Purification Plant of the Indianapolis Water Company is being arranged, and at 2:30 P.M. on the same day there will be a trip to the Biological Plant of the Eli Lilly Company. This plant is approximately 20 miles east of Indianapolis on the National Road just outside the town of Greenfield where James Whitcomb Riley, the children's poet, first saw the light of day. For the visiting ladies a tea and travel talk will be given at the same hour at Sculptor's Hall, John Herron Art Institute. The speaker on this occasion will be Dr. Charles P. Emerson, a member of a commission which last year visited the Orient, and who in his interesting and inimitable style will give his impressions of that part of the world. The day's entertainment will close with music and dancing at 9:30 P.M. following the Presidential Reception.

On the morning of Tuesday, October 10, the Eli Lilly Company will take those signing up for the trip through their Indianapolis Plant, and at 2:30 P.M. buses will transport delegates and visitors to the meeting to the Indianapolis Medical Center. This Medical Center consists of a group of hospitals, which includes the Indiana University School of Medicine, the Indiana University School of Dentistry, the Indianapolis City Hospital, the Robert W. Long General Hospital, the Coleman Maternity Hospital, and the Riley Memorial Hospital for Children.

To lovers of the American folk song a visit to Foster Hall will be of interest on Wednesday at 10:00 o'clock in the morning. Foster Hall was built by Mr. J. K. Lilly and dedicated to the memory of Stephen C. Foster who gave us such treasures as "Old Folks at Home," "Uncle Ned," "Old Kentucky Home," "Nelly Was a Lady," and other masterpieces which have traveled through the century. Foster Hall has a collection of original writings and belongings of Stephen C. Foster and is the best of its kind in the United States.

On Wednesday afternoon at 2:30 a tour of Indianapolis will take place which will offer the opportunity of seeing points of interest, which include the Scottish Rite Cathedral reputed to be the finest cathedral of its kind in the country; the national headquarters of the American Legion, home of James Whitcomb Riley, the famous motor speedway, beautiful municipal parks and playgrounds. While on this visit it is expected that there will be a 20-minute concert by the carillon of the Scottish Rite Cathedral. These chimes came from Loughborough, England, and were donated by one of Indianapolis's citizens at a cost of $250,000. A Memorial Session at which there will be some of the survivors of the Havana Yellow Fever experiments and the

banquet will take place Wednesday evening at 6:30, following which there will again be dancing and refreshments to offset the strenuous day's activities.

An inspection of a model sewage plant in one of the smaller towns not far from Indianapolis will be made on the afternoon of Thursday, October 12, by sanitary engineers.

Transportation will be furnished for all trips, and automobiles will be available for those desiring special trips or visits. Of course there will be golf during the entire week and a special arrangement for golf by the ladies at one of the Indianapolis country clubs—and a shopping tour is also being planned for the lady visitors.

NEW MEMBERS

The following list includes applicants who have been approved for membership in the A.P.H.A. by the Sub-Committee on Eligibility. These new members have requested affiliation with the sections indicated, and action by the Section Council will follow.

Health Officers Section

Frank O. Alley, B.S., Box 238, Bar Harbor, Me., Health Officer

J. Leake, M.D., New Kien Bldg., Portsmouth, Va., Health Director, Norfolk-Princess Anne Counties

J. S. McBride, M.D., 300 Public Safety Bldg., Seattle, Wash., Commissioner of Health

Gavin J. Telfer, M.D., 703 California State Bldg., Los Angeles, Calif., District State Health Officer.

Laboratory Section

Enrique E. Ecker, Ph.D., 2085 Adelbert Road, Cleveland, O., Associate Professor of Immunology, Western Reserve University

Katharine M. Howell, M.D., 2900 Ellis Ave., Chicago, Ill., Head of Department of Bacteriology and Serology, Michael Reese Hospital, Nelson Morris Memorial Institute

Donna E. Kerr, M.A., 763 Hornby St., Vancouver, B. C., Canada, Assistant Director, Provincial Board of Health Laboratories

Arthur W. Wright, M.D., 136 S. Lake Ave., Albany, N. Y., Director, Bender Hygienic Laboratory

Public Health Engineering Section

C. Fred Berghout, B.S., 757–27 St., Ogden, Utah, Statistical Assistant

W. V. Brumbaugh, 927–15 St. N.W., Washington, D. C., Secretary, National Lime Assn.

Lincoln Continentino, C.E., Avenida Alvares Cabral 414, Belo Horizonte, Brazil, Inspector of Sanitary Engineering, Dept. of Public Health of Minas Geraes (Assoc.)

Archie B. Freeman, B.S., Box 482, Morehead City, N. C., Assistant Sanitary Engineer, State Board of Health

William U. Gallaher, 306 W. Prospect Ave., Appleton, Wis., Chemist, Appleton Water Dept.

R. H. Lefmann, City Hall, University City, Mo., Supervisor of Sanitation

Gus H. Radebaugh, Urbana, Ill., Manager, Urbana and Champaign Sanitary District

Edward Thornton, C.E., Box 273, Katonah, N. Y., Assistant Engineer, Department of Water Supply, Gas and Electricity of New York City

Industrial Hygiene Section

Leonidas R. Harless, M.D., Gauley Bridge, W. Va. (Assoc.)

Edward C. Holmblad, M.D., 20 W. Jackson Blvd., Chicago, Ill., Regional Chief Surgeon, Railway Express Agency

Food and Nutrition Section

Paul L. Day, Ph.D., School of Medicine, University of Arkansas, Little Rock, Ark., Professor of Physiological Chemistry

Conrad A. Elvehjem, Ph.D., Agr. Chem. Bldg., University of Wisconsin, Madison, Wisc., Professor of Agricultural Chemistry

Fannie Krieger, Fairmont, W. Va. (Assoc.)

Winifred W. Wencke, Box 456, Logan, W. Va., District Director, American Friends Service Committee

Public Health Education Section

Charles Auerbach, 49 St. & Grays Ave., Philadelphia, Pa., Manager, West Disinfecting Co.

Vivian Drenckhahn, C.P.H., 708 Ellicott St., Buffalo, N. Y., Health Teacher, Buffalo Tuberculosis Assn.

Rudolph H. Sundberg, M.D., 2001–4th Ave.,

San Diego, Calif., Member of staff of Rees-Stealy Clinic

Child Hygiene Section

Helen D. Bull, M.D., 817 E. State St., Ithaca, N. Y., Professor of Parent Education, Cornell University

David Goldberg, M.D., Westwood, N. J., School Physician

Florence Houghton, 1050 Koppers Bldg., Pittsburgh, Pa., Social Worker, Koppers Coal Company.

Ethel D. Owen, M.D., 909 Hyde St., San Francisco, Calif., Supervising School Work for Prevention of Tuberculosis

Carroll E. Palmer, M.D., 615 N. Wolfe St., Baltimore, Md., Instructor, Dept. of Biostatistics, School of Hygiene and Public Health, Johns Hopkins University

Public Health Nursing Section

Letha S. Allen, R.N., 69 Main St., Tuckahoe, N. Y., Director, Public Health Nursing Organization

Montserrat Bipol, Paris 179, Barcelona, Spain (Assoc.)

E. Pauline Bledsoe, McPherson County Red Cross, McPherson, Kans., County Public Health Nurse

Maria L. Caperochipi, Hersani 19–20, San Sebastian, Spain, Nurse (Assoc.)

Dorothy J. Carter, R.N., N.O.P.H.N., 450–7th Ave., New York, N. Y., Assistant Director

Mary A. Helterline, R.N., 42 W. Maiden St., Washington, Pa., Supervisor, American Red Cross Nursing Service

Eleanor L. Kennedy, R.N., State Bureau of Public Health, Santa Fe, New Mexico, State Supervisor of Public Health Nursing

Donna Pearce, R.N., State Dept. of Public Health, Nashville, Tenn., State Supervising Nurse

Epidemiology Section

Elsie F. Dochterman, A.B., 611 W. 171 St., New York, N. Y., Research Assistant in Epidemiology, De Lamar Institute of Public Health, College of Phys. & Surg., Columbia Univ.

Henry C. Ricks, M.D., C.P.H., State Board of Health, Jackson, Miss., Director, Bureau of County Work and Epidemiology

P. K. Telford, M.D., 1349 Warner Ave., Los Angeles, Calif., Chief, Division of Tuberculosis, Los Angeles County Health Department

Unaffiliated

Lars Gulbrandsen, M.D., 1853 W. Polk St., Urbana, Ill., Instructor, Department of Bacteriology and Preventive Medicine, University of Illinois.

DECEASED MEMBERS

Prof. F. P. Gorham, Providence, R. I., Elected Member 1899, Fellow 1922.

Dr. E. M. Pickens, College Park, Md., Elected Member 1927, Fellow 1930.

Magnus W. Alexander, New York, N. Y., Elected Member 1928 (Associate).

John W. Carey, Barnhardt, Mo., Elected Member 1930.

Calvin L. Cooper, M.D., Kansas City, Mo., Elected Member 1929.

Gideon J. Ferreira, M.D., Duluth, Minn., Elected Member 1928.

J. S. Horner, M.D., W. Pawlet, Vt., Elected Member 1921.

C. Wilson Miller, Columbia, S. C., Elected Member 1928.

J. O. Skinner, M.D., Washington, D. C., Elected Member 1917.

Francis H. Slack, M.D., Coolidge Corner, Mass., Elected Member 1905.

Agnes Walker, M.D., Bolinas, Calif., Elected Member 1919.

Gordon Wilson, M.D., Baltimore, Md., Elected Member 1919.

James W. Wiltse, M.D., Albany, N. Y., Elected Member 1926.

BACK NUMBERS OF JOURNAL NEEDED

Due to unusual demands for the July, 1932, August, 1932, September, 1932, numbers of the *Journal*, and for the January, 1933, and February, 1933, numbers, the Executive Office of the A.P.H.A. is in need of as many copies of these issues as are obtainable. It will be greatly appreciated if members who can spare these *Journals* will send them to headquarters. Those complying with this request will be reimbursed for the postage used in mailing.

CORRECTION

In the paper, "Resident Mortality from Tuberculosis in Urban and Rural New York According to Age, Sex, Color, and General Nativity," by Elizabeth Parkhurst, on pages 903 and 906 of the September *Journal*, are two charts, above which should appear the words "Male" on the left, and "Female" on the right.

PUBLIC HEALTH ADMINISTRATION

Pittsburgh, Pa.—The August issue of *Pittsburgh's Health* contains the first résumé of the activities of the health department which has been printed for many years. The report gives a very complete description of the organization of the department, the number employed in each service, and a numerical résumé of the activities for the past year. In Pennsylvania, vaccination against smallpox is compulsory for all school children. This service is performed by the school physician only when so desired by parents unable to pay. School physicians administer toxoid and give the Schick test. It is estimated that by the end of the year 52 per cent of the children of school age had been immunized.

New Haven, Conn.—The July *Bulletin* contains a résumé of the health conditions in New Haven for the first half of the year 1933. For the first 6 months of 1933 there was a total of 1,019 deaths compared with 945 for a similar period during the preceding year. The death rate has increased from 11.6 in 1932 to 12.5 in 1933. Influenza and pneumonia are largely accountable for the increase. An outstanding feature is the absence of any deaths from the common communicable diseases as compared to a total of 5 for 1932. Cases of diphtheria have totalled but 2 for each of the years and but 5 carriers have been found in 1933 as compared to the period in 1932 when 27 were found. A most notable feature for the 1933 period is the absence of any typhoid fever case.

Shorewood, Wis.—This residential suburb of Milwaukee, with an estimated population of 14,000 in 1932, continues to be one of the honor cities in the annual Inter-Chamber Health Conservation Contest conducted by the U. S. Chamber of Commerce. The annual report contains a rather complete description of the activities of the department, well illustrated. It is reported that over 90 per cent of the school children are protected against diphtheria and smallpox and that more than 80 per cent of infants and children of preschool age have received diphtheria protection. Not a single case of diphtheria or smallpox has been reported in Shorewood during the past 3 years. It is the policy to give the Schick test to every school child before administering toxoid or toxin-antitoxin.

For the sixth consecutive year the report contains a self appraisal of the community health service. The weighted score is now 945 points in a possible 1,000. It is stated that Shorewood is penalized since it is a high grade residential suburb, but the self appraisal endeavors to make reasonable allowance for these phases of the measuring stick which cannot be applied without interpretation to non-industrial communities.

Diphtheria Protection in New York—The *Health News* of the New York State Health Department for August 7 reports that more than 1,000,000 upstate children have received either three doses of toxin-antitoxin or two inoculations of toxoid. One-fourth of the protected children were under 5 years of age at the time of inoculation. Since 1926 the number of deaths from diphtheria in New York State, exclusive of New York City, has

shown a steady decline from 250 to 59. The deaths among children under 5 years of age have been reduced from 123 to 22. To increase the number of preschool children protected requires something in addition to the usual publicity methods. The home visitation by nurses has proved productive of results.

Hygienic Institute—The 18th department of health report for the district comprising La Salle, Peru, and Oglesby, Ill., for the year 1932, shows a per capita expenditure of 90 cents as contrasted with $1.41 for the previous year. A fairly large proportion of the income was derived from an endowment provided for this area with a population of 26,208. The Institute is governed by a board of 5 trustees who select the full-time medical director.

Several illustrations of coöperation among agencies are noted. The Tri-City Tuberculosis Society closely affiliates with the Institute and furnishes a nurse, while the Institute equips the nurse with a car and directs her activities to avoid duplication. The three cities contribute to the sanitary program and two boards of education aid with the school nursing. By contract with the Metropolitan Life Insurance Company, the Institute does the bedside nursing work for policy holders. "This work coincidentally helps the Institute to register many prenatal cases, which furnishes the very beginning for public health work. This company also distributes, yearly, thousands of pamphlets valuable to public health." There is also close coöperation with the La Salle-Peru township high school, Tri-City Family Welfare Society, and relief agencies, in their various health endeavors.

LABORATORY

ANTIGENIC VALUE OF COMMERCIAL DIPHTHERIA TOXOIDS*

WILLIAM LEVIN, DR.P.H., F.A.P.H.A. AND HELEN A. CARY, M.D.

Hygienic Laboratory, State Board of Health, Portland, Ore.; and Medical Director, City Schools, Portland, Ore.

THE use of toxoid in immunization against diphtheria has had wide application in the past few years, and in some communities has entirely replaced the use of toxin-antitoxin. The preference for toxoid has been attributed to its better immunizing effects and, by some, to the smaller number of injections necessary for immunization. Evidence has accumulated on the effectiveness of toxoid as an immunizing agent. Park and Schroder [1] state: "The immunizing effects of our best toxoid have been better than from the best properly standardized toxin-antitoxin." Harrison [2] believes that toxoid is the best agent for immunizing children 6 years and under. Many other workers, both in this country and abroad are enthusiastic in their reports on the efficacy of toxoid as an immunizing agent.

There has been less agreement, however, on the number of doses as well as on the time interval between doses required for immunization. Ramon [3]

* Read before the Laboratory Section of the American Public Health Association at the Sixty-first Annual Meeting in Washington, D. C., October 27, 1932.

uses 0.5 c.c. for the first dose; 1.0 c.c., 3 weeks later, for the second dose, and 1.5 c.c., 15 days later, for the third dose. Park recommends 3 doses of 0.5 c.c. given at weekly intervals. Most manufacturers in the United States recommend that the toxoid be given in two 1.0 c.c. doses at an interval of 3 or 4 weeks. The potency of the toxoid must be known before any conclusions can be drawn as to the size and number of doses required for immunization. Commercial toxoids now on the market specify the dosage; no information, however, is given regarding their potency.

The potency of a toxoid as expressed by its antigenic value, may be determined approximately by the Ramon flocculation test, or more certainly by the guinea pig protection test. In the former, a standardized antitoxic diphtheria serum is brought in contact in suitable proportions with the toxoid. The reaction, characterized by the formation of flocculi, may be expressed in terms of flocculating units per c.c. The determination of the potency of toxoid by the guinea pig method is required by the National Institute of Health for toxoid manufactured or to be sold in the United States. The minimum protection must be such that the initial human dose of toxoid will immunize 80 per cent of the guinea pigs in 6 weeks, so that 5 m.l.d.'s of diphtheria toxin will fail to kill in 10 days.

Ramon used toxoids of at least 10 antigenic or flocculating units per c.c. Park and his coworkers are using toxoids which average 10 antigenic units per c.c. Immunity with such toxoids has been obtained in from 94 to 98 per cent of cases. Povitzky,[4] in examining toxoids from different manufacturers found wide variation in antigenic values as determined by the flocculation test. Some toxoids had less than 1 antigenic unit; others from 4.2 to 7 per c.c.

To test the efficacy of several brands of diphtheria toxoid sold in Oregon, a series of experiments was conducted which included the determination of the antigenic values of each toxoid, as well as the actual percentage of children immunized by it.

Diphtheria toxoids A, B, C, D, and E were obtained in the open market. Each lot was divided into 3 portions; one was sent to Dr. Povitzky, of the Bureau of Laboratories, New York City Health Department, for the determination of the flocculation values; one was used in the guinea pig protection tests; and one was used in the immunization of children.

The flocculation values as reported by Dr. Povitzky are given in Table I.

TABLE I

FLOCCULATION UNITS OF COMMERCIAL DIPHTHERIA TOXOIDS

Toxoid	*Units per c.c.*
A	8.9
B	3.4–3.8
C	5.8
D	Around 2
E	Around 2

The guinea pig protection tests were made in accordance with the requirements of the National Institute of Health, the only variation being that half of the immunized animals were injected with 5 m.l.d.'s and the other half with 20 m.l.d.'s of diphtheria toxin. Fifty guinea pigs of an average weight of 301 gm. were divided into 5 lots of 10 each. Each pig in the lot was injected, subcutaneously, with 1 c.c. (the initial human dose) of the toxoid under investigation. At the expiration of 6 weeks half of each lot of pigs received 5 m.l.d.'s, and half, 20 m.l.d.'s of diphtheria toxin. Four pigs died following the injection of toxoid; 1 died 40 days after injection with toxoid A; 1, 25 days; and 1, 29 days after injection with toxoid B; and 1, 40 days after injection with toxoid C. Death in all was due to pneumonia.

TABLE II

IMMUNITY CONFERRED ON GUINEA PIGS TESTED WITH 5 M.L.D. DIPHTHERIA TOXIN 6 WEEKS AFTER SINGLE INJECTION OF TOXOID

Toxoid	Flocculation Units	No. of G.P. Injected	Deaths in Days										Guinea Pigs Surviving	
			1	2	3	4	5	6	7	8	9	10	Number	Per Cent
A	8.9	5	0	1	0	1	0	0	0	0	0	0	3	60
B	3.6	4	0	1	0	0	0	0	0	0	0	0	3	75
C	5.8	5	0	0	0	0	0	0	1	0	0	0	4	80
D	2	5	2	2	0	0	0	0	0	0	0	0	1	20
E	2	5	0	2	1	0	0	0	0	0	0	0	2	40
Control		1	1	—	—	—	—	—	—	—	—	—	0	0

TABLE III

IMMMUNITY CONFERRED ON GUINEA PIGS TESTED WITH 20 M.L.D. DIPHTHERIA TOXIN 6 WEEKS AFTER SINGLE INJECTION OF TOXOID

Toxoid	No. of G.P. Injected	Deaths in Days										Guinea Pigs Surviving	
		1	2	3	4	5	6	7	8	9	10	Number	Per Cent
A	4	0	1	0	0	0	0	0	1	0	0	2	50
B	4	0	1	2	0	0	0	0	0	0	0	1	25
C	4	1	0	0	0	0	0	0	0	0	0	3	75
D	5	5	0	0	0	0	0	0	0	0	0	0	0
E	5	2	1	0	0	0	0	0	0	0	0	2	40
Control	1	1	—	—	—	—	—	—	—	—	—	0	0

Tables II and III give the results of the guinea pig protection tests.

Post-mortem findings on the guinea pigs dying as the result of the toxin injection indicated that death in all cases was due to diphtheritic toxemia, except possibly in 1 of the A Group since evidence of pneumonia was found in 1 which died on the 8th day following the injection of 20 m.l.d. of diphtheria toxin.

Immunization of children with toxoid was limited as far as possible to those within the 10-year age group. It was found necessary, however to include some of a higher age group. A preliminary Schick test was given to 572 children 15 years and under, and to 88 adults, none of whom, so far as could be determined, had had diphtheria or had been immunized against it either with toxin-antitoxin or toxoid. The results are given in Table IV.

Of the 482 Schick positive reactors 467 were given the initial 1 c.c. dose of toxoid—441 children and 26 adults. Each lot of toxoid was given to approximately the same number of children. Lots A, C, and D were given to children in the Portland public and parochial schools; and lots B and E were given to those in the Salem public schools, and to children and adults in the State Institution for the Feeble-Minded, Salem.

A few children who gave a combined

TABLE IV

RESULTS OF PRELIMINARY SCHICK TEST

Age Group	Total Number Tested	Schick Positive	Per cent Non-Immune
4–5	9	8	88.9
6–10	408	363	88.9
11–15	155	85	54.8
16 and over	88	26	29.5

(protein) Schick reaction were excluded from the toxoid immunization and were given toxin toxin-antitoxin instead. Three weeks after the first toxoid injection a second injection of 1 c.c. was given. While there were a few local reactions following the injection of the toxoid, there was a marked absence of systemic reactions. This was in contrast to what followed the administration of toxoid by one of us (H. A. C.) to children without a preliminary Schick or sensitization test, when very severe local and at times systemic reactions resulted.

Three months following the second toxoid injection, the final Schick test was given. Removals, illness, and other causes were responsible for a large reduction in the number of those given the test for acquired immunity. Of 467 given the initial dose of toxoid, only 380 were available for and were given the final Schick test. Table V gives the results of the toxoid immunization in children between the ages of 5 and 15 years.

A total of 26 Schick-positive persons ranging in age from 16 to 50 years were also given toxoid B and 2 of these gave a positive Schick on the re-test. Of the 71 persons given toxoid B, 95.8 per cent were immunized. Nineteen children of the 5–15 year age group who did not get a preliminary Schick test were given two 1 c.c. doses of toxoid E, with a 3-week interval between doses; 16, or 84.2 per cent, were shown to be immune after 3 months. Twenty-eight children in the same age group, also without a preliminary Schick test, were given two 1 c.c. doses of toxoid B with a 3-week interval between doses; 27 or 96.4 per cent were shown to be immune after 3 months.

A comparison of the antigenic values of the toxoids tested by the various methods already outlined is given in Table VI.

According to federal standards it appears that only toxoid B and C met the requirements of an 80 per cent survival against 5 m.l.d.'s diphtheria toxin. Toxoid A, with a high flocculation value, showed up poorly both in the guinea pig test and in the percentage of immunes produced in children. The manufacturers of toxoid A, stated:

> This toxoid was preserved with phenol and there has accumulated considerable evidence that the phenol as a preservative at times interferes with the immunizing property of the toxoid, without affecting more than in a light degree at least the flocculating value. We are discontinuing the use of phenol as a preservative.

With the exception of toxoid A, the results show a fair correlation between the antigenic values of the various toxoids obtained with the Ramon flocculation test and with the guinea pig protection test. The latter method, however, gave a truer index of the potency as expressed in the immunity conferred on children. The recent advances made in the concentration and purification of toxoid by precipitation with alum [1, 5, 6] fortify our belief

TABLE V

IMMUNITY CONFERRED IN CHILDREN 5 TO 15 YEARS BY TWO DOSES OF 1 C.C. TOXOID INJECTED AT 3-WEEK INTERVAL

Toxoid	*No. of Children Re-Schicked*	*No. of Schick Reactors*		*Per cent Immunized*
		Positive	*Negative*	
A	73	13	60	82.2
B	45	1	44	97.8
C	79	0	79	100.0
D	77	12	65	84.4
E	80	8	72	90.0

TABLE VI

COMPARATIVE ANTIGENIC VALUES OF TOXOIDS OBTAINED BY FLOCCULATION, GUINEA PIG PROTECTION AND HUMAN INJECTION METHODS

Toxoid	Date of Expiration 1933	Diluted	Flocculation Value	Guinea Pig Protection Test Per cent Survival		Per cent Children Immunized
				5 m.l.d.	20 m.l.d.	
A	May 4	Undiluted	8.9	60	50	82.2
B	May 15	1 + 1	3.4–3.8	75	25	97.8
C	May 30	Undiluted	5.8	80	75	100.0
D	June 8	1 + 3	Around 2	20	0	84.4
E	Apr. 26	1 + 1	Around 2	40	60	90.0

that the present federal minimum standards of potency are too low. The use of the flocculation test for the determination of the suitability of a toxin for the production of a toxoid is unquestioned. Our experiments, however, indicate that the flocculation value in itself is not a sufficiently reliable index of the potency of a toxoid, and should, therefore, not replace the guinea pig method. The use of both methods for the determination of the antigenic value is recommended.

A potent toxoid should be expected to give from 95 to 100 per cent immunity. One of the surprises in our experiments was the high degree of immunity conferred by toxoids of low antigenic values. Carefully controlled immunization tests on Oregon children with toxin-antitoxin by one of us (W. L.) never yielded a degree of immunity higher than 80 per cent. At the same time, it must not be overlooked that in mass immunization toxin-antitoxin may be given with impunity, whereas, in the administration of toxoid the problem of protein reactions presents itself. Unquestionably, with the attainment of a pure toxoid, that problem may be solved.

Our experiments indicate that two doses of a potent toxoid given at an interval of 3 weeks, may be expected to give a high percentage of immunes. It is interesting to note that a diluted as well as an undiluted toxoid gave good results. Park believes that if the dosage is 0.5 c.c. (undiluted), 3 doses at weekly intervals should be given. The standards of potency of the National Institute of Health require that "the maximum human dose shall not exceed 1 c.c. of undiluted toxoid."

Further studies on toxoid, particularly on its standardization, are highly imperative. The suggestion of Schmidt of Copenhagen that the antigenic unit be termed "Immunizing Unit" is worthy of serious consideration. Once the potency of such a unit has been agreed upon and defined, the manufacturers of toxoid should be required to state on their labels the potency of their product in terms of "I. U." Until such time we must rely upon a Schick re-test 3 or 4 months after the last toxoid injection.

SUMMARY AND CONCLUSIONS

Five commercial makes of toxoid were tested for their antigenic values by the Ramon flocculation test, by guinea pig protection tests, and by human experiment. Considerable variation in their antigenic values was found. There was fair correlation between the antigenic values of the various toxoids obtained by the Ramon flocculation test and by the guinea pig protection method, the latter method, however, paralleled more closely the results obtained in the immunization of children.

A total of 354 children between the ages of 5 and 15 were given two injections of 1 c.c. each of toxoid at a 3-week

interval. The percentage of children who became immune ran from 82.2 to 100. The results warrant the belief that a potent toxoid should give from 95 per cent to 100 per cent immunization.

Both the flocculation and guinea pig tests should be used in the determination of the antigenic value of a toxoid. The present minimum potency standards of the National Institute of Health should be raised, and steps should be taken to define and adopt a standard potency unit.

Since there is considerable variation in the antigenic value of toxoids now on the market, a Schick re-test 3 or 4 months after the last immunizing injection is highly recommended.

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VITAL STATISTICS

Vital Statistics for Canada, 1932—According to a preliminary report from the Dominion Bureau of Statistics, there were 235,143 live births in Canada (exclusive of the Yukon and Northwest territories) in 1932, compared with 240,473 in 1931. The birth rate for 1932 was 22.4 (per 1,000 population); the corresponding figure for 1931 was 23.2. A marriage rate of 6.0 (per 1,000 population) was registered in 1932; in 1931, 6.4. In 1932, deaths from all causes numbered 104,190, resulting in a mortality of 9.9 (per 100,000 population)—as against 104,517 deaths and a rate of 10.1 in 1931. The 1932 death rate from all causes showed a decline of 13 per cent from the rate (11.4) recorded in 1926 when the present registration area of 9 provinces was established.

The low general mortality rate for 1932 was effected mainly through declines in such individual causes of death as tuberculosis which showed a death rate of 68 per 100,000 population in 1932 (74 in 1931); diarrhea and enteritis, 36 in 1932 (50 in 1931); diseases of early infancy, 76 in 1932 (87 in 1931); and violent deaths—63 in 1932 (69 in 1931). Fortunately the effect of the decreases in the foregoing death rates was not nullified by increased death rates in 1932 from diseases of the heart—146 per 100,000 population (132 in 1931); diseases of the arteries, 65 (58 in 1931); influenza, 40 (31 in 1931); nephritis, 54 (50 in 1931); and cancer, 95 (92 in 1931).—Tables from—*Preliminary Report of Vital Statistics of Canada*, 1932, pp. 2, 3, 10; *Preliminary Report of Vital Statistics of Canada*, 1931, pp. 3, 10.

Births by Nativity of Mother in Pennsylvania in 1932—A total of 168,553 live births was reported in Pennsylvania in 1932. Live births to native born mothers numbered 147,724, or 88 per cent of the total recorded; those to foreign born mothers totaled 20,744. There were also 85 birth certificates on which the nativity of the mothers was not stated.

During the past 10 years there has been a decided decline in the number of births to foreign born mothers in Pennsylvania. Foreign born mothers

accounted for 28 per cent of the total live births in 1922, 20 per cent in 1927, and 12 per cent in 1932; this ratio has dropped 57 per cent in the period 1922 to 1932. Of the live births to mothers of foreign nativity, 5,666 or 27.3 per cent were to those of Italian birth; 3,578 or 17.3 per cent to Austrian mothers; 2,319 or 11.2 per cent to Polish; 1,561 or 7.5 per cent to Russian; 1,443 or 7.0 per cent to Irish; 1,328 or 6.4 per cent to English, Scotch, and Welsh; and the remaining 4,829 or 23.3 per cent to German, Greek, Scandinavian and other foreign nationalities.—Pennsylvania Dept. of Health. *Vital Stat. Bull.* 8:5 (Aug.), 1933.

Scottish Vital Statistics for 1932—Reports just published show that the general death rate in Scotland for the year 1932 increased slightly over the rate of 13.26 per 1,000 population which was recorded in 1931. The rate in 1932 was 13.5. Infant mortality also increased in 1932, a rate of 86 deaths under 1 year per 1,000 births being recorded that year in comparison with 82 in 1931 and an average of 85 for the previous 5 years. However, the death rate from tuberculosis reached a record low figure of 84 per 100,000 population in 1932 as against 87 in 1931.

The birth rate in Scotland, which has been declining constantly, dropped in 1932 to a new low rate of 18.6 per 1,000 population. This is approximately half the rate (35.62) recorded in 1876, the year showing the maximum birth rate in Scotland.

In a discussion of the causes of the decline in the birth rate, it is pointed out that it cannot be explained by a diminution of the marriage rate or increase of the average age on marriage. From 1861 to 1901 the average age on marriage showed little variation—from 27.2 to 27.5 years. Since 1901 there has been but a slight increase, the average age at marriage being 27.8 in 1930. The decline in the birth rate started in 1876, while the increase in age at the time of marriage began much more recently. Moreover, the married population at the censuses of 1901, 1911, and 1921 was, as regards age, more favorably constituted for a high rate than in 1885.—*J.A.M.A.* 101:457 (Aug. 5), 1933.

Where and How Men Get Hurt—The chance of accident to the man on the street is less than is generally supposed. Out of an aggregate number of 117,477 injuries studied by the Accident and Health Department of the Metropolitan Life Insurance Company, there were only 9,078, or 7.7 per cent of the total, that happened while walking on streets and highways. The public travel accident hazard is of even less importance; for only 2.2 per cent of the injuries happened on buses, taxicabs, street cars, trains, boats, airplanes and other public conveyances. These figures relate to a group of persons who are employed in non-hazardous occupations and whose ages range between 18 and 65 years.

The vast majority of accidents occur in places which the average man seldom associates with danger—at home, in offices, in stores and in sports and games. Out of more than 117,000 injuries that were studied, close to 17,000 occurred in homes or on home premises; another 40,000 occurred within the apparently safe confines of office buildings, hotels, stores, clubs, and other public structures. Altogether, 49 per cent of all the accidents occurred inside of buildings or in private grounds where people might feel that they were comparatively safe from harm. Then, there were nearly 13,000 accidents, or 11 per cent of the total, that occurred in the common games and sports that are indulged in by the average man. These include such supposedly harmless sports as tennis, golf, skating, and even danc-

ing. Over 25,000 injuries, or 21 per cent of the total, occurred to persons riding in privately owned automobiles. The main causes of these automobile accidents were collisions with other cars, skidding, and caring for the automobiles.

A considerable number of injuries were sustained in very ordinary ways. First, missteps and falls caused nearly one-third of the total injuries. These occurred most commonly on sidewalks, on stairs, over rugs and over other objects on floors. Getting in or out of bed is hardly to be considered a dangerous activity; and yet 76 men fell and were injured in this manner. The ordinary bathtub or shower, which in the past was accused of many casualties, accounted for only 557, or less than one-half of 1 per cent. The second important group of injuries were from broken glass, nails, other sharp instruments, and splinters. These make up 18 per cent of the total. Third in order of importance, with 17 per cent of the total, were injuries by vehicles. In this class the automobile is the chief offender. Together, these three broad classes of injuries accounted for 66 per cent of the total. The remaining 34 per cent were due to being struck by falling or flying objects, to colliding with other persons or objects, to burns or explosions, to being caught in doors and windows and to a variety of other happenings.

Injuries are, for the most part, due to trivial and minor mishaps which can readily be avoided. In the aggregate, however, these preventable accidents cause an immense amount of discomfort, as well as the waste of huge sums of money because of time lost from work and the cost of medical care.—Met. Life Ins. Co. *Stat. Bull.* 14:8–10 (July), 1933.

Vital Statistics Records for New Jersey for 1932—In 1932, New Jersey recorded a general death rate of 10.11 per 1,000 population in comparison with the rate of 10.63 recorded in both 1930 and 1931. The rate of 10.63 had previously been the lowest death rate from all causes registered in the state since the establishment of the State Department of Health.

The decline to this new low figure was aided by the 1932 death rate from typhoid fever (0.7 per 100,000 population), diphtheria (2.2 per 100,000), tuberculosis (60.6 per 100,000); and deaths under 1 year of age (49.6 per 1,000 live births)—which were the lowest rates ever recorded in the state for these individual causes of death.

Since 1912 the annual death rate from typhoid fever in New Jersey has not exceeded 10 per 100,000 population—a rate far removed from the maximum death rate of 74.3 recorded in 1882; the highest mortality rate from this disease during the past 5 years was 1.7 (1928). Diphtheria has also declined greatly. In 1888 this cause of death exacted a toll of 148 per 100,000 population; during the decade beginning with 1900, the rate declined from 48 to 25; the following decade showed a drop to 18 per 100,000; finally the figure fell to 2.2 in 1932. The 1932 death rate from all forms of tuberculosis (60.6 per 100,000) is very favorable in comparison with the rate of 90.1 which was recorded for this disease only 8 years ago.

Puerperal causes showed a death rate of 5.7 per 1,000 live births in 1932 compared with 5.9 in 1931. Deaths due to accidents in which moving automobiles were involved totaled 1,158 in 1932 as against 1,302 for 1931.

In 1932 approximately 62,250 births were recorded, equivalent to a rate of 14.6 per 1,000 population. The total number of births reported showed a decline of approximately 2,000 from the 1931 figure.—New Jersey *Pub. Health News.* 17:143–44 (July-Aug.), 1933.

PUBLIC HEALTH ENGINEERING

A HYPOCHLORITE FEEDING DEVICE*

FRANK R. SHAW, ROBERT W. KEHR AND EDWIN T. MATTHEWS

Sanitary Engineer; Assistant Sanitary Engineer; and Sanitary Engineering Assistant, U. S. Public Health Service, Chicago, Ill.

THE principle involved in this hypochlorite feeding device is that of syphoning the hypochlorite solution from a container or containers and delivering it through a stop-cock, a capillary tube and a chlorine-resisting hose to the point of application. This principle is illustrated in the accompanying sketches of two forms of the device. Since a 2 mm. stop-cock and a ¼" diameter hose are used as standard practice, the size and length of the capillary tubing serves as the restriction or orifice to effect control of the flow. A wide range of flows may be established by the use of different sizes and different lengths of capillary tubing. The period of time during which the hypochlorite will flow continuously can be increased at will by using a larger container or additional like containers and connecting them by syphons.

Where very accurate administration of hypochlorite is desired, there could be installed a constant level box at a distance of 1′ or more below the bottom of the container or containers. Under such an arrangement, the contents of the hypochlorite container or containers would be syphoned to the constant level box by means of an unrestricted ¼" diameter hose attached to a float valve on the constant level box. From the constant level box the hypochlorite would flow to the point of application through the 2 mm. stop-cock, the proper capillary tubing and the necessary ¼" hose. In this case, the total head would be measured from the surface of the hypochlorite in the constant level box. It should be borne in mind that the constant level box and all of its working parts must be made of materials non-corrosive to chlorine, such as glass, hard rubber or sterling silver.

TECHNICAL FACTORS

The device, without the provision of a constant level box, was originally developed for use in super-chlorination and in connection with filtration and activated carbon chlorine removal. With such an application, one would not be concerned about the concurrent reduction of flow due to the ever increasing syphon lift as the hypochlorite container emptied; but would simply arrange for the desired chlorine dosage under the conditions of the lowest rate of flow. It is obvious that the reduction in flow is a function of the total head under which the apparatus is working. Calibration of various lengths of various sizes of capillary tubing under different heads indicated the per-

TABLE I

Total Head	*Per Cent Decrease in Flow*
3′	22
5′	13
8′	6
12′	4
17′	3

* To be read before the Public Health Engineering Section of the American Public Health Association at the Sixty-second Annual Meeting in Indianapolis, Ind., October 10, 1933.

centages of decrease in flow from a 5 gal. pyrex bottle between the first 1,000 c.c. and the last 1,000 c.c. (Table I).

These figures suggest the desirability of operating under a head of 5′ or more so as to minimize the decrease in the rate of flow. These figures also warrant the opinion that the application of the device need not be limited to use in conjunction with activated carbon dechlorination, especially when operated under heads of from 5′ to 17′ or more. For a 0.5 p.p.m. minimum dose, there would be created a maximum dose of 0.515 p.p.m. under a 17′ head; 0.52 p.p.m. under a 12′ head; 0.53 p.p.m. under an 8′ head and 0.565 p.p.m. under a 5′ head.

When the device operates under gravity flow the total head is the distance from the surface of the hypochlorite in the container to the upper end of the capillary tubing. When the hypochlorite is applied to the suction of a pump the total head is the static suction lift of the pump plus the friction losses in the pump's suction pipe, plus the distance from the top of the capillary tubing to the surface of the hypochlorite.

The time required to empty the hypochlorite container is governed by the capillary tubing. In every case the hours of flow are determined by the period of time desired between recharging of the hypochlorite container. In the case of a pump operating 5 hours each day, a capillary tube of such size and length would be selected as to require 5 hours or slightly more to empty the hypochlorite container under the particular head which pertains to the problem.

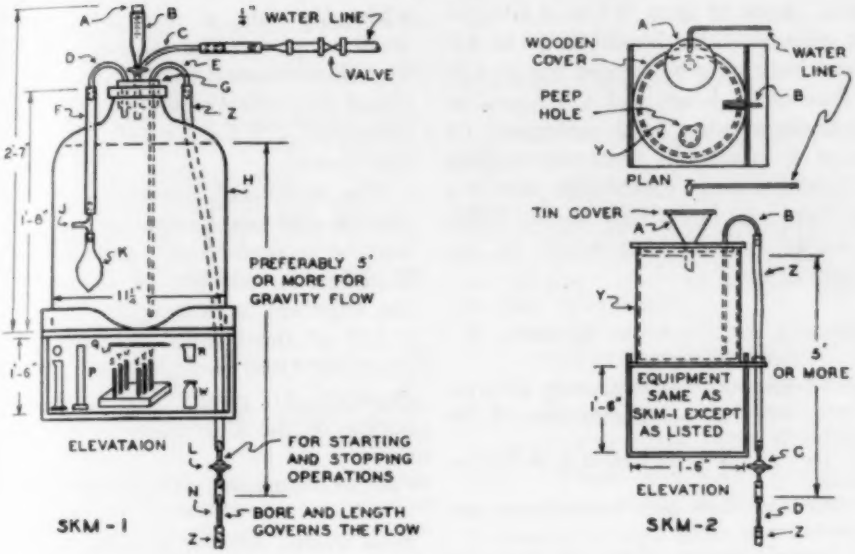
To establish a guide for the selection of the proper size and proper length of capillary tubing, certain lengths of the several sizes of capillary tubing were calibrated as to time while flowing under certain heads. The water used in this calibration was Chicago City water which is unfiltered Lake Michigan water and therefore high in its plankton content. The results of this calibration for 5 gal. of water appear under the heading of "Hours of Flow." With filtered or well water and a clear hypochlorite solution, longer hours of flow might be established by using ½ mm. capillary tubing.

From this tabulation, it is easy to select the size and length of capillary tubing for any particular installation or from it determine the number of 5 gal. units needed to establish the time of flow desired. If the total head, either by gravity flow or pump suction, is 8′ and it is desired to have a 5 gal. bottle last 4 hours, then one has the choice of a 4″ length of ¾ mm. or a 15″ length of 1 mm. capillary tubing. If an 8 hour flow is desired under the same conditions, then a 10 gal. container or two 5 gal. containers connected by a syphon would be installed.

A container of any size may be used in connection with a constant level box and without such a box where the percentage reduction in flow is not a factor, such as where chlorine taste is not objectionable or where the chlorine is removed by activated carbon. If the depth of the hypochlorite in the container is no greater than the depth of the hypochlorite in a 5 gal. pyrex bottle then the above percentages of reduction in flow would hold true regardless of the quantity of hypochlorite involved. If the depth of the hypochlorite is appreciably greater than that in a 5 gal. pyrex bottle then a greater percentage of change in flow will occur.

The temperature of the water used in the calibration of the capillary tubing was between 19° C. and 22° C. It was thought that the temperature of the liquid may have a noteworthy influence on the flow. Tests under different heads and under water temperatures as high as 40° C. revealed an average increase

FIGURE I



in flow of only 0.24 per cent per centrigrade degree of temperature. This would be of no consequence within the range of temperature under which the device would be operated.

It was first thought that calcium from the hypochlorite solution would deposit on the inside of the capillary tubing. In such an event it was planned to instruct the operator to replace the tube frequently and soak the used tube in vinegar (or acetic acid) over night and then flush it with water. Experience has shown that there is little or no tendency for deposits to collect on the inner surface of the tubes, even where the hypochlorite is made locally from the high test powdered products. Apparently a scouring velocity occurs in the tube. In one installation using 18" of ¾ mm. capillary tubing and in another using 12" of 1 mm. tubing, replacements were made only after daily use over periods of 6 and 8 months respectively.

Although the above indicates that the deposition of calcium is not a factor, it is advisable to make the stock solution of hypochlorite as clear as practical, to use a clear water in preparing and diluting the hypochlorite and to replace the capillary tubing at regular intervals, such as once a week or once a month. The tubes cost but $.20 each; so therefore breakage in handling is of no importance.

THE EXTENT OF USE

This device, in one or the other form, has been in use by the federal government on one installation during a period of more than 2 years, on another installation during a period of over 1 year, and on two other installations during a period of over 6 months. Four installations were recently made at Indian Emergency Conservation Camps and the equipment has been purchased for four additional installations by federal officials who were convinced of the practical application of the device through observation of the earlier installations.

The rate of flow treated in these cases ranges from 4 gal. to 60 gal. per minute. The device is not particularly limited to low rates of flow. By feeding undiluted 14.5 per cent hypo-

chlorite and effecting a dose of 0.5 p.p.m., flows of from 915 to 5,500 gal. per minute under heads of 3′ to 17′ respectively may be treated for periods of time of 27 hours and 4.5 hours respectively with one 5 gal. container. Of course it is obvious that with regular treatment over a considerable part of a day there is a rate of flow beyond which it would not be economical to use hypochlorite.

Formula for Computing Quantity of Hypochlorite

H. Number of cubic centimeters of hypochlorite needed for each charging of the hypochlorite feeder

G. Rate of flow to be treated in gallons per minute

T. Time of flow from hypochlorite container *in hours*

d. Desired chlorine dosage in parts per million (pounds per million pounds)

p. Percentage strength of hypochlorite stock solution to be used, expressed as a decimal.

$$H = \frac{0.22712 \times G \times T \times d}{p}$$

Conversion Table

1 gallon	= 3,785.4 c.c.	= 128	fluid ounces
1 quart	= 946.4 c.c.	= 32	fluid ounces
1 pint	= 473.2 c.c.	= 16	fluid ounces
1 gill	= 118.3 c.c.	= 4	fluid ounces

DESCRIPTION OF THE HYPOCHLORITE FEEDER

For the purpose of identification the initials SKM have been assigned to this device. Two types of the device have been developed, one known as the SKM-1 and the other as SKM-2.

An illustration of each type appears elsewhere.

SKM-1—The SKM-1, which involves the syphoning of the hypochlorite solution from a 5 gal. bottle or carboy, was designed primarily for use on steamships where the rolling and pitching of the vessel required that the hypochlorite container be all enclosed. It also has a feature by which the syphon can be started by means of an air pressure bulb.

This type is also especially applicable where the rate of flow is sufficiently small to permit the measuring of the hypochlorite stock solution to be introduced into the bottle by means of a graduated 125 c.c. or 250 c.c. separatory funnel.

The equipment needed for this device is standard laboratory ware and may be secured from any large dealer. However, for purposes of identification, the numbers appearing in Catalogue C-227 of the Central Scientific Company, 460 Ohio Street, Chicago, Ill., and elsewhere, are given. The index letters appear on the illustration.

List of Equipment—Hypochlorite Feeder SKM-1

From Central Scientific Company (or other dealer)

Numbers refer to catalogue C-227

A. Rubber stopper, one hole, to fit half-way into funnel "B." ⁋11572B

B. Funnel, separatory, pyrex, cylindrical, etc., 250 c.c. capacity. ⁋6161

C, D & E. Glass tubing, combustion, pyrex, std. wall, 8 mm. outside diameter, bent as follows: ⁋7206X

	Short Leg	*Long Leg*	*Diameter of Bend*
C. (L tube)	2″	2″	¾″
D. (U tube)	1″	2″	¾″
E. (U tube)	1″	20½″	¾″

F. Rubber tubing, black, pure gum, heavy wall. ⁋11596–¼″

G. Rubber stopper with 4–7 mm. diameter holes on right angles axes 3/16″ clear of edge of smaller side. ⁋11572A X Size 12

H. Bottle, pyrex glass, narrow mouth, 5 gal. ⁋1604

J. Tube, connecting, glass, T-shape, O.D. 3/16″. ⁋14006A

K. Rubber bulb with metal valve for pressure only. ⁋11530

L. Stop-cock, pyrex glass, straight bore of 2 mm. ⁋12909

N. Glass tubing, capillary, pyrex, gauged accurately both ends of size and length for particular installation. ⁋7203 (Purchaser should select from tabulation of hours of flow under different heads.)

O. Cylinder, graduated in 1 c.c., capacity 100 c.c. ⁋3659KA

P. Color comparator tube, Nessler, A.P.H.A.

Std., tall form with rubber stopper to fit. ♯3026B

Q. Pipette, 1 c.c. capacity, graduated in tenths. ♯10506KC

R. Beaker, pyrex glass, usual tall form with lip, 300 c.c. capacity. ♯1136

S, T, U, V & W. Lamotte Enslow Comparator parts. (Central Scientific Co.)

S. Ampule of distilled water
T. Ampule of 0.2 p.p.m. color std.
U. Ampule of 1.0 p.p.m. color std.
V. (3) Test tubes for set.
W. 100 c.c. orthotoluidine (use 0.5 c.c. for test)

From Most Convenient Source

Z. Chlorine resisting hose, medium wall, ¼" inside diameter

NOTE: There should be purchased at the outset an extra or spare of all glass and earthenware parts, four to six pieces of capillary tubing of the size and length needed, 12' of hose "F" and the proper length of hose "Z" to reach the point of application.

SKM-2—The SKM-2, which involves the syphoning of the hypochlorite solution from one or more 10 gal. crocks, was designed for those cases where the device would not be subject to motion and where a considerable flow of water is treated and a large quantity of the stock solution of hypochlorite is introduced into the hypochlorite feeder. Where more than a 10 gal. quantity is required to establish flow for the entire period of treatment, two or more 10 gal. crocks may be connected together by syphons. The equipment needed for the SKM-2 is as follows:

From Central Scientific Company (or other dealer)

Numbers refer to catalogue C-227

A. One-half gal. glass funnel. ♯6126

B. Glass tubing, combustion, pyrex, std. wall, 8 mm. outside diameter, ♯7206X, bent in U-shape with short leg 1", long leg 20" and diameter of bend 3"

C. Stop-cock, pyrex, straight bore of 2 mm. ♯12909

D. Glass tubing, capillary, pyrex, gauged accurately both ends, of size and length for particular installation ♯7203. (Purchaser should select from tabulation of hours of flow under different heads.)

O. Cylinder, graduated in 5 c.c., capacity 500 c.c. ♯3659KA

P, Q, S, T, U, V & W. Same as indicated for SKM-1

From Most Convenient Source

Y. Ten gal. crock

Z. Chlorine resisting hose, medium wall, ¼" inside diameter

NOTE: There should be purchased at the outset an extra or spare of all glass and earthenware parts, four to six pieces of capillary tubing of the size and length needed, and the proper length of hose "Z" to reach the point of application.

ASSEMBLY AND OPERATION

The glass tubing extending from the stop-cock should be cut off at a distance of 2" from the center of the stop-cock. Where a regular gauge glass cutter is not available the cutting may be done by filing a slight groove entirely around the tube with a triangular file and then bending it at this point. Withdraw the core of the stop-cock and with a toothpick, wire or the like, remove any vaseline in the holes. If the vaseline on the ground surfaces of the core or socket does not appear to be fresh, remove it and apply fresh vaseline. The core should be cleaned and resurfaced with fresh vaseline periodically, once a week or once a month. If the core becomes "frozen" (stuck) release it by immersing in warm water for a short period of time. Tube "P," when filled with vinegar, is intended for use in soaking the capillary tubes to remove any calcium deposit. Vinegar may also be used to clean other parts of the feeders.

In the case of SKM-1, 5 c.c. graduations may be established on the funnel "B" by shellac and lines of paint, or by strips of tape at the points determined by measuring accurately the different quantities of water in cylinder "O" and then pouring it into the funnel. One c.c. equals 1 ml. Insert the glassware into rubber stopper "G" by wetting both the tube and the hole

with water. Push the tube into the stopper on a straight line, or turn the tube clockwise and counter-clockwise only slightly and easily if found necessary. In the event of gravity feed, the syphon is started by holding a finger over the outlet of tee tube "J" and compressing the air with bulb "K."

In the case of SKM-2, syphon tube "B" is held in place by attaching a cleat or wrapping friction tape about the tube at the proper point so as to suspend it correctly. The weight of the delivery line "Z" should be carried by a cleat or friction tape on the shelf and not on the syphon tube "B." For gravity flow the syphon is started by filling the delivery hose from the stopcock to the point where the hose is attached to tube "B."

The hypochlorite feeders must be operated on the basis of an orthotoluidine color test at the beginning of each day's operation. New color standards should be purchased every 6 months.

THE ORTHOTOLUIDINE COLOR TEST

1. Fill two test tubes "V" to the mark with the water to be tested.

2. Draw from bottle W into pipette "Q" a sufficient quantity of orthotoluidine nearly to fill the pipette. Lower the orthotoluidine in the pipette to the zero mark, returning all surplus orthotoluidine to the bottle as it is expensive. Introduce 0.5 c.c. of the orthotoluidine into one of the test tubes containing the water.

3. Mix the orthotoluidine and the sample of water by placing the thumb over the test tube and inverting it several times. Allow to stand for 2 minutes.

4. Place the orthotoluidine treated sample in front of the distilled water sample "S" and the untreated sample in the rear of the color standard "T" or "U." Hold them opposite good light and observe the color by looking through them from the side.

5. The chlorine dosage is determined by making the test immediately after the chlorine is introduced and the chlorine residual 15 minutes after the chlorine is introduced. The latter should always be at least 0.2 p.p.m. The amount of chlorine needed to produce this residual at the end of 15 minutes is dependent upon the chlorine absorbing matter in the water. With waters relatively free of such matter a dose of 0.5 p.p.m. will produce a 0.2 p.p.m. residual, whereas waters high in such matter may require 0.8, 1.0, or a higher dosage in p.p.m. Where dechlorination is being effected with activated carbon a dose of not less than 1 p.p.m. should be applied or rather a residual of at least 0.5 p.p.m. just before contact with the carbon should be produced.

COST OF HYPOCHLORITE FEEDER

In August, 1933, the cost of single units with duplicate glassware (except the orthotoluidine set), 6 capillary tubes, 12′ of black gum rubber hose and 12′ of red chlorine resisting hose was, as follows: SKM-1, $33.44; SKM-2, $19.86.

HOURS OF FLOW

FIVE GALLONS OF LAKE MICHIGAN WATER THROUGH CERTAIN LENGTHS OF CERTAIN SIZES OF CAPILLARY TUBING UNDER DIFFERENT HEADS

Head in Feet	*Size of Tubing in Millimeters*	*Length of Capillary Tubing*					
		3″	*6″*	*9″*	*12″*	*15″*	*18″*
3	¾	7.6	11.5	15.5	19.4	23.3	27.1
	1	4.0	5.8	7.6	9.4	11.1	12.9
	1¼	1.9	2.3	2.8	3.2	3.7	4.1
	1½	1.6	2.0	2.4	2.9	3.3	3.7
	1¾	1.4	1.6	1.8	2.0	2.3	2.5
5	¾	5.1	7.0	8.9	10.7	12.6	14.4
	1	2.6	3.6	4.5	5.5	6.4	7.4
	1¼	1.6	1.8	2.0	2.1	2.3	2.5
	1½	1.4	1.6	1.8	2.0	2.2	2.4
	1¾	1.0	1.2	1.3	1.5	1.6	1.7
8	¾	3.7	4.7	5.7	6.7	7.8	8.8
	1	2.1	2.5	3.0	3.5	4.0	4.5
	1¼	1.1	1.3	1.6	1.8	2.0	2.3
	1½	1.0	1.2	1.4	1.6	1.8	2.0
	1¾	0.8	1.0	1.1	1.2	1.3	1.4
12	¾	2.9	3.5	4.1	4.8	5.4	6.0
	1	1.8	2.2	2.5	2.8	3.2	3.5
	1¼	0.9	1.1	1.3	1.5	1.6	1.8
	1½	0.7	0.9	1.1	1.2	1.4	1.5
	1¾	0.7	0.8	0.9	0.9	1.0	1.1
17	½ *	4.3	5.9	7.5	9.0	10.6	12.2
	¾	2.6	3.0	3.4	3.8	4.1	4.5
	1	1.6	1.9	2.2	2.4	2.7	2.9
	1¼	0.8	0.9	1.0	1.2	1.3	1.4
	1½	0.7	0.8	0.9	1.0	1.1	1.2
	1¾	0.5	0.6	0.7	0.8	0.8	0.9

* Distilled water

INDUSTRIAL HYGIENE

Dr. J. A. Orenstein Honored—At the sixth annual scientific meeting of the Medical Association of South Africa (British Medical Association) which was held in the University Buildings, Groote Schur, from September 25 to 30, the Association's gold medal for meritorious services was presented to Dr. J. A. Orenstein. (Our readers will be interested to know that Dr. Orenstein is a Charter Fellow of our section on Industrial Hygiene, having joined when he was with Dr. William C. Gorgas in the Panama Canal Zone, nearly 20 years ago.)—*Science* 2017:165 (Aug. 25), 1933. E. R. H.

Incidence of Illness Among Male Industrial Employees in 1932 as Compared with Earlier Years—In a study of 40 industrial establishment sick benefit funds for 1932, as a whole the frequency of cases of disabling sickness lasting 8 days or longer, among a sample group of male industrial employees, differed little from the incidence recorded for the preceding year. In each of the past 3 years, in fact, the sickness rates for this group have exhibited remarkable stability at a lower incidence level than during the 1927–1929 period.

For certain causes of disability, however, greater changes in frequency may be noted. The respiratory disease rate was higher in 1932 than in either of the 2 immediately preceding years, due chiefly to an unusual prevalence of influenza in March and again in December, 1932.

Although the influenza rate was higher in 1932 than in 1931, there was no increase in pneumonia.

As has been pointed out in previous communications, these sickness rates are based on the reports of a group of about 40 industrial establishment sick benefit funds, and apply in the main to employed men, although many work only on a part-time basis. For information concerning the health of the unemployed, other data obviously are required.—Dean K. Brundage, *Pub. Health Rep.* 48, 30:869–871 (July 28), 1933. E. R. H.

Correspondence Committee on Industrial Hygiene—Some fifteen members of the Correspondence Committee on Industrial Hygiene met at the International Labour Office July 3 to 5, 1933.

The meeting examined the draft of the forthcoming *Grey Report* relating to the extension of the list of occupational diseases contained in a Schedule to the International Convention on this subject, with special reference to the conclusions of the report relating to silicosis. After some discussion these conclusions were formulated in accordance with the views of the experts.

The meeting also drew up a formula for certain forms of poisoning to be added to the list of diseases giving rise to compensation; these included the halogen derivatives of the fatty series. In the course of the discussion on silicosis the meeting decided on the proposal of Dr. Bridge, to recommend that a study be made of the possibility of including fibrosis due to asbestos dust in the list of occupational diseases giving rise to compensation.

The meeting examined various questions of industrial hygiene which it decided to place on the agenda of the next meeting. These included medical in-

spection of factories, medical supervision in the factory, the study of work of a light, medium, and heavy character, the nutrition of workers, an inquiry into the health of hat makers, etc.—*Indust. & Lab. Inf.* 47, 3:119 (July 17), 1933. E. R. H.

Health Hazard from Dust in the Mines and Allied Industries of the United States—Initial Survey of the Extent and Severity—A brief historical review is followed by a listing of the various public and private agencies, and their duties, in regard to the subject of the title. Dissemination of information is not only from these agencies but from the technical press, the International Labour Office, and manufacturing concerns. The present day makes an interesting comparison with the beginnings of a movement 25 years old.

The extent and severity of dust diseases is shown with tables, in connection with metal mining (including mills), coal mining (including washing), smelting and refining (nonferrous), smelting (ferrous) and the manufacture of cement.

While no grand totaling is given of the numbers of workmen exposed to the dust hazard in the various industries, the separate totals are sufficient to indicate the wide extent of this kind of hazard.

There is no reason to think that human ingenuity and care will not develop methods of prevention or removal, even as it has done in aerial and gas warfare.

It seems a fair guess that, as metals and minerals become scarcer, the comminution of lower grade ores and rocks, largely siliceous, will increase the quantity of dust produced, since about 60 per cent of the earth's crust is composed of silica. It is evident that humanity has been exposed in some degree to the dust hazard for some little time, and that it probably has developed a certain constitutional immunity through the ages that will carry it past this hazard. The paper is intended for discussion.—M. Van Siclen, Amer. Inst. of Min. and Metal Eng. (29 West 39th Street), New York, N. Y., *Contribution No. 45*, Aug., 1933, 13 pp. E. R. H.

The Size Frequency of Industrial Dusts—Author's summary:

The results of measurements of 18,000 outdoor dust particles showed that nearly all of these are less than 1 micron in average diameter. The median size was found to be 0.5 μ. In contrast with this result it was found that only 21 per cent of about 6,000 industrial dust particles were less than 1 μ in size, the majority (69 per cent) being between 1 and 3 μ. The median size of the industrial dust particles was found to be 1.5 μ. These results clearly indicate that in conducting industrial dust studies our concern should be only for those particles ranging in size from 0.5 to 5 μ.

The instrument used in sampling industrial dust in air, the standard impinger apparatus, is shown to be capable of collecting, with a high degree of efficiency, dust particles of the sizes found in this study. The standard method used in enumerating dust particles is shown to take into account about 85 per cent of the dust present in industrial atmospheres. In addition, our studies have shown that a high correlation exists between dust counts obtained with our technic and the degree of silicosis and tuberculosis found in a study of health of granite cutters. The present study clearly indicates that the method used in enumerating dust particles collected by the impinger apparatus constitutes a valuable and practical index of the hazardousness of dust inhalation.—J. J. Bloomfield, *Pub. Health Rep.* 48, 32:961–968 (Aug. 11), 1933. E. R. H.

Some Common Industrial Health Hazards—An occupational disease is an affliction which is the result of exposure to an industrial health hazard, while an industrial health hazard is any condition or manner of work that is unnatural to the physiology of the human being so engaged.

Author's summary follows:

1. It requires industrial health hazards to produce occupational diseases. Therefore, data on occupational diseases help to define such health hazards.

2. Standardization of reporting forms is advised as well as laws requiring the reporting of occupational diseases, irrespective of compensability.

3. It is considered that among the commonest industrial hazards are the following, which are discussed in some instances with statistics:

(1) The poisons—particularly lead, volatile solvents, and irritants including corrosives.

(2) Fatigue—which even in a period of depression is still a matter of unrestricted hours, night work, child labor, female labor, and a consideration of strain of bodily parts, particularly noticeable as tenosynovitis.

(3) Dust—which at present involves chiefly silica and silicates used extensively in various industries and requires common sense methods of control before refinements in certain particulars.

(4) Air conditions—which hinge upon the subject of temperature, atmospheric cooling power, and effective radiation, the latter of which is stressed both because it is a rather new discovery in physiological relationships and because it is often of the greatest importance in comfort and efficiency.

Various precision instruments for determining air conditions were demonstrated (described in the discussion).—Emery R. Hayhurst, paper before International Assn. of Industrial Accident Boards & Commissions, Columbus meeting. *U. S. Labor Bull.* 577:190–205, 217–224 (Apr.), 1933.

E. R. H.

The Silica Content of Lungs—The author refers first to the chemical analysis of post-mortem lungs from coal miners and associated workers, 35 all total, in South Wales, which he published in collaboration with Professor Lyle Cummins in 1930 in the *Journal of Pathology & Bacteriology* (33: 1095).

The present report consists of the analysis of 60 cases which are divided into 6 groups, depending upon the percentage of silica found in the dried lung substance. These percentages ran from less than 0.3 per cent to a total silica exceeding 2.4 per cent of dried lung substance. The author points out that of all dusts to which industrial workers may be exposed, "coal dust" in the mines is the most concentrated. This coal dust contains 0.6 per cent or more of siliceous matter which might amount to 50 particles of the same per c.c.

The Australian and South African workers have agreed that the "danger limit" for the purer forms of silica is 200 particles per c.c. Thus it would appear quite possible for a coal miner to inhale as much as 2 mg. of actual silica during a day's work. Working 250 days a year, 0.5 gm. of silica might reach the lungs in a year and in 10 years as much as 5.0 gm. could be inhaled.

In a study of the lungs of 24 coal miners whose deaths were due to accident or illness and not especially to lung fibrosis, analysis showed an average of 4.1 gm. total silica in the lungs of each man (1.15 per cent of the dried lung). Their total time of exposure to mine dust varied from 20 to 50 years. Thus an important proportion of silica inhaled must have been disposed of by drainage, or excreted. Nevertheless, an ordinary coal miner may acquire progressive damage to the lymphatic drainage so that after age 50, a damage to the lungs from the silica fraction may assume serious proportions. Experience among the Welsh coal miners certainly indicates 50 to 53 years as the "critical age" in this respect.

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spection of factories, medical supervision in the factory, the study of work of a light, medium, and heavy character, the nutrition of workers, an inquiry into the health of hat makers, etc.—*Indust. & Lab. Inf.* 47, 3:119 (July 17), 1933.
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Coal dust alone, apart from silica,

cannot be regarded as a cause of serious fibrosis of lungs, and such minimal fibrosis as does occur in this class of worker can be explained as due to the action of traces of siliceous dust present even in high-grade "pure" coal.

Collins and Gilchrist (*J. Indust. Hyg.* 1928:101) have shown that coal miners have an excessive mortality rate from pneumonia and bronchitis.

The conclusion is that when the silica content of the lungs exceeds 1 per cent of the dried lung substance, the resulting fibrosis clearly contributes toward death. When the silica content exceeds 1.6 per cent the associated fibrosis is sufficient in itself to lead to death.—A. F. Sladen, *Lancet*, 5733:123–125 (July 15), 1933. E. R. H.

Review of Silicosis—The author's article appears serially in the *New York Industrial Bulletin* in February, April, June, and July, 1933. Subjects of discussion are: Part I, Definition of silicosis; chemical properties of silica; Part II, Exposure to silica dust in industry; factors in the development of silicosis; silicosis abroad; silicosis in the United States (by industries); summary of hazardous industries; silicosis in New York State; Part III, Symptoms and course of silicosis; physical signs, complications of silicosis, X-ray appearances. — Adelaide R. Smith, *Indust. Bull.*, Dept. of Labor, 12, 32–33, 90–92, 144–146, 176–178, 1933. E. R. H.

Court Decisions—Bronchitis, aggravated by exposure to inhalation of gas and smoke to result in steady coughing, is an occupational injury compensable under the Massachusetts law.—Massachusetts Supreme Judicial Court.

A man employed on construction work died from sunstroke while working overtime in the sun on a hot day. Compensation to the widow was denied; but, upon appeal, the ruling was reversed and compensation awarded on the ground that the workman was exposed to a far different hazard than the public generally.—New Jersey Court of Errors and Appeals.

An employee was in a camp at a training school for salesmen. One night a severe storm blew down his tent and he was drenched and caught a cold which developed into acute arthritis, necessitating hospitalization. Compensation was denied; but upon appeal the decision was reversed and the case was remanded with directions to award compensation.—New York Appellate Division.—*Bull. Assn. of Cas. & Sur. Ex.*, 34:20, 22 (July), 1933. E. R. H.

Compensation for Silicosis—Data published in the "Sixth Annual Report of the Workmen's Compensation Commission of New South Wales" (pp. 53–57) indicate that the cost and expense of compensating for silicosis, in special occupations in the County of Cumberland, under "Workmen's Compensation (Silicosis) Scheme 1," from September, 1927, to April, 1932, have averaged about 6 per cent of wages.—*Bull. Assn. of Cas. & Sur. Ex.* 34:13 (July), 1933. E. R. H.

Bite by Infected Wood Tick Held Compensable—A traveling salesman employed by The Boise Grocery Company traveled through a tick infested area doing his regular duties. While extricating his car from a mud hole, a wood tick embedded itself in his right leg (March 27, 1932). On March 31 he also found a tick bite on his left shoulder. He was taken sick a few days later, entered a hospital in Boise on April 5 and died of Rocky Mountain spotted fever 11 days later.

The Supreme Court of Idaho upheld the Industrial Accident Board in making an award to the widow with the

statement that the highways he traveled, the hotels he stopped at, and the stores he visited became and were his workshop; they were the places where he constantly spent his time and worked for his employer. . . . Consequently, the deceased was exposed to the danger of being bitten by an infected wood tick in a greater degree than those who lived in the wood tick territory and traveled over the highways traversing it.—*Month. Labor Rev.* 37, 2:314 (Aug.), 1933. E. R. H.

Workmen's Compensation Act Held Not to Take Away Right of Action for Noncompensable Disease Caused by Employer's Negligence—The West Virginia Supreme Court of Appeals in the Jones v. Rinehart & Dennis Co., Inc. (168 S. E. 482), decided it seemed clear that an employee had a right of action at common law for diseases arising out of his employment through the negligence of his employer, and that, if such right of action had not been taken away by the compensation act, the administratrix of the decedent in the instant case had the right to prosecute the action under the statute relating to death from a wrongful or negligent act.

Recurring to the query as to whether the above quoted statutory provision exempted an employer, who was protected by the compensation act, from liability for a wrong to an employee arising from a disease contracted in the course of his employment through the negligence of his employer, even though the disease was not compensable under the compensation statute, the court said that it was " difficult to perceive a satisfactory and reasonable basis for exemption of employers from liability for disease caused by their negligence, such disease being noncompensable under the compensation statute," and declared that " we are of opinion that it was the legislative intent, as expressed in our compensation law (Code 1931, 23–2–6, Code 1932, sec. 2516), to exempt employers from liability for damages at common law or by statute for compensable injury or death of employees, however occurring, but not to exempt from liability for noncompensable dis ease (caused by negligence of the employer) or death resulting from such disease."—*Pub. Health Rep.* 48, 26: 764–766 (June 30), 1933.

E. R. H.

Occupational Dermatitis and Compensation—The author gives tables to show dermatitis classified according to decision of referee, to length of disability and disposition of cases, to parts affected and disposition of cases, to causative agent and disposition of cases—the whole with accompanying discussion.

In all, 520 claims for occupational dermatitis were heard during the 18-month period covered in the report. Of these, 240 or 46 per cent were disallowed, and 182 or 35 per cent received awards. More than half of the disallowed cases were so disposed of because the disability did not exceed 7 days, or the claimant failed to appear, or the disease was not contracted in the course of employment, or for similar reasons. Since the law does not give complete coverage for all forms of industrial dermatitis, the only remedy is to change the law to cover " any disease proved to be due to the claimant's employment."—Freda S. Miller, *New York Indust. Bull.* 12, 3–4: 60–61, 84, 88–89, 94 (Mar. and Apr.), 1933.

E. R. H.

What Determines Compensability for Skin Diseases Among Industrial Workers?—Discussion is given at length concerning the differential diagnosis of occupational dermatoses, the function of patch tests, the importance of history of previous skin affections,

sensitization and allergy, complications of industrial dermatitis with relation to industrial compensation, and a suggestive course of action for compensation bodies.

The latter subject of discussion (course of action) is of particular interest as a guide for compensation purposes and should be read in the original. In connection with his paper Dr. McCord demonstrated, with the assistance of Mr. Wiley, some examples of patch tests. A valuable discussion follows.—Dr. Carey P. McCord, paper before Internatl. Assn. of Industrial Accident Boards & Commissions, Columbus meeting. *U. S. Labor Bull.* 577:205–217, 217–224 (Apr.), 1933.

E. R. H.

Compensation for Occupational Diseases in Denmark—The Danish Act of May 20, 1933, relating to compensation for industrial accidents, which will come into force on October 1, 1933, provides also for compensation for a number of occupational diseases.

These include, in addition to those covered by the Convention on this subject adopted by the International Labour Conference in 1925 (lead poisoning, mercury poisoning and anthrax), chronic and recurrent skin diseases due to exotic woods, and lung diseases due to inhalation of dust from stone and ores in eight specified industries. The Act does not cover skin diseases caused by certain products which were included in the original Bill.—*Indust. & Labour. Inf.*, 47, 1:41 (July), 1933.

E. R. H.

A Modern Plan for a Community Campaign Against Air Pollution—The author considers air, water, and food purity equally important. The discussion concerns smoke regulation, a survey of atmospheric pollution—soot-fall, air-borne solids, sulphur dioxide, natural sunshine, other meteorologic data, and an inquiry concerning the causes of pollution, with a brief word on legislation and economic applications.

City dwellers have a right, as a matter of public health, to expect the standard of air purity will be brought up to a parity with that already fixed for water and food; that the rôle of leadership in this movement belongs to the medical profession; that current conditions are unusually favorable for campaign success; that a workable plan of campaign would help immediately to reduce unemployment, spur scientific research, aid infant industries and assist in the restoration of real estate values.

"In conclusion, be assured that in connection with whatever action you may take you are free to call upon Mellon Institute of Industrial Research for any assistance it may be able to give, in the light of its 20 years of scientific investigation of the problems of air pollution."—H. B. Meller, *Am. J. Med. Sc.* 737:157–165 (Aug.), 1933.

E. R. H.

Temperature Gradient Observations in a Large Heated Space—The authors investigated the temperatures at various levels in the field house at the University of Wisconsin. The description of the heating and ventilating system is given. Excerpts from the conclusions follow:

Under gravity circulation and near zero outside temperature conditions, a temperature gradient of about ¾° per foot was found for the first 15 ft. of elevation and about 1/10° per foot from 15 ft. to 97 ft. at the peak of the roof.

A fan system is considered desirable in this type of building in order to reduce humidity by the introduction of outside air and at times to remove the heat from the audience.

It is considered safe and desirable in

this type of a building that the designer use the temperature gradient observed under gravity circulation rather than any found with fan recirculation.—G. L. Larson, D. W. Nelson, and O. C. Cromer, *Heating, Piping and Air Conditioning*, Sept., 1933, pp. 477–485.

E. R. H.

Zinc in Relation to General and Industrial Hygiene—Authors' summary:

1. In 1925, a publication of the Public Health Service (*Reprint 1029*) placed a limit of 5 p.p.m. of zinc in drinking water. This limit has been applied freely to many conditions in which zinc is ingested. Since the zinc is not of itself poisonous, and many times 5 p.p.m. may be taken without harmful effects, it is suggested that this limit, which gives a relatively innocuous metal an undeserved reputation for toxicity, be increased or done away with altogether.

2. Foods or beverages, with the exception of simple or chlorinated drinking water, should not be stored in zinc-lined or galvanized containers. Acid drinks and foods will invariably cause solution of zinc and the formation of simple compounds of zinc which irritate the stomach and may cause vomiting.

3. A single industrial condition arises from zinc and this condition is not produced by zinc alone. This is the "zinc chill," better known as metal fume fever. The different groups of symptoms described as chronic industrial zince poisoning, together with other complex ills which have been ascribed to zinc, may be disregarded, as they are due to contamination by other substances.—Cecil K. Drinker and Lawrence T. Fairhall, *Pub. Health Rep.* 48, 32:955–961 (Aug. 11), 1933. E. R. H.

Lead Absorption and Compensation—The author distinguishes between lead absorption and lead poisoning. In an examination of 381 lead workers, 149 presenting a clinical picture suggestive of lead absorption and laboratory tests confirmed the diagnosis in approximately two-thirds of these. In the remaining one-third, it was considered that the symptom-complexes present were probably due to other causes. None of these workers were incapacitated. In lead absorption workers may be apparently healthy and have no complaints. Hence they present no problem because there is no disability but they demand general prophylaxis and prevention of acute lead poisoning.

Compensation cases are those where disability is actual or claimed. In acute cases the diagnosis can usually be made with a sufficient degree of certainty. In the subacute cases the difficulties of diagnosis on the basis of the clinical picture alone are obviously very great. Thus constipation, severe headache, or abdominal pain may or may not be due to lead poisoning. The probability that lead exposure is a cause would appear to be approximately (from the above) two to one. Here careful laboratory tests are valuable and compensation may be justified. The worker very properly should be given the benefit of what slight doubt exists.

For several years the New York State Division of Industrial Hygiene has offered to make the necessary tests for physicians at cost, but for some reason physicians have not availed themselves of this offer. About two-thirds of the troublesome cases could probably be disposed of, from a compensation point of view, if the physicians would prepare their cases fully, including the necessary laboratory tests of blood and urine.—May R. Mayers, *Indust. Bull.*, New York Dept. of Labor, 12, 2:33–34 (Feb.), 1933.

E. R. H.

FOOD AND NUTRITION

Microbiology of Frozen Foods. VI. The Survival of Pathogenic Microörganisms in Ice Cream—Numerous studies have been made on the longevity of pathogenic microorganisms in dairy products with the exception of ice cream. This product has no doubt been neglected because freezing was thought to be destructive to microörganisms. However, numerous epidemics of disease have been traced to ice cream. Since tuberculosis is the most important disease transmitted by dairy products the longevity of these organisms in ice cream was studied. Two members of the salmonella group were also studied. The following organisms were used: *S. aertrycke, S. enteritidis, Br. abortus* Bang, *Br. abortus* porcine, *Br. melitensis, Mycobacterium tuberculosis* hominis (Strains A, I and S), *Mycobacterium tuberculosis* bovis and *Mycobacterium tuberculosis* avium.

Guinea pigs were injected with 1 c.c. amounts of the ice cream samples containing the Brucella and tubercle organisms. All animals remaining alive after 2 months were necropsied. The animals inoculated with the ice cream tubercle bacilli were examined, at the time of death, for characteristic lesions of the spleen and liver and at the point of injection. The paratyphoid and undulant fever organisms were frozen in the ice cream for a period of 36 months and in all cases the organisms were still viable and present in sufficient numbers to be rather easily detected. The different strains of the tubercle bacilli were still viable and potent after 30 months. All produced characteristic lesions in guinea pigs in a comparatively short time.

While the artificially inoculated ice cream contained more organisms than would be encountered in ice cream made from naturally infected raw milk, such data suggest that ice cream should not be considered as a safe food just because it is frozen.—G. I. Wallace and Rhoda Crouch, *J. Dairy Sci.* 16:315 (July), 1933.

The Vitamin B and G Content of Wheat Germ, Rice Polishings, Cottonseed Flour and the Residue from Fermented Rye Flour—Rats, 28 to 29 days old, were used as experimental animals. In testing for vitamin B, a basal diet of purified casein, Osborne and Mendel salt mixture, starch, butterfat, cod liver oil and yeast was fed. In testing for vitamin G, a basal diet of purified casein, Osborne and Mendel salt mixture, butterfat, cod liver oil and the extract from 90 gm. of white corn plus cornstarch to make 100 per cent was fed.

In both cases, at the end of the 2-week depletion period the material to be tested was fed. At the end of the 8-week test period, the rats were killed and autopsied.

The samples of wheat germ, cottonseed flour, and rice polishings were found to be excellent sources of vitamin B. All three substances contained approximately one-half as much of the antineuritic factor as did a composite sample of dried yeast. As a source of vitamin G they differed widely. Wheat germ was found to be the richest of the three substances, containing about one-sixth as much vitamin G as did the yeast. Cottonseed flour was found to have about one-tenth as much of this vitamin as yeast, while rice polishings

had only about one-twentieth. Whole wheat (soft winter) was found to be a relatively poor source of both vitamins B and G. The flour made from the residue from fermented rye grain contained a very small but appreciable amount of vitamin B.—Hazel E. Munsell and Grace M. Devaney, *Cereal Chemistry*, 10:287 (July), 1933.

Vitamin C Content of Baldwin Apples and Apple Products—Since Nelson and Mottern in 1932 (*A.J.P.H.* 22, 6:587–600, June, 1932), reported that lead arsenate sprays applied to orange trees considerably reduced the vitamin C content of the fruit, and since apples are almost universally sprayed with arsenic compounds and other toxic substances, the present investigations were undertaken to compare sprayed and unsprayed Baldwin apples grown in Massachusetts. Lime-sulphur and lead arsenate were used and the usual spray schedule was followed.

Guinea pigs were fed, in proportion to their weight, a basal ration of rolled oats and wheat bran, vitamin C-free baked milk powder, butterfat, cod liver oil, and salt. All vitamin C was derived from the apples. The sprayed apples were found to be fully as rich in vitamin C as the unsprayed apples. Four gm. daily of either sprayed or unsprayed Baldwin apples per 300-gm. guinea pig, gave excellent weight gains and full protection from scurvy. In 2 of 3 tests the sprayed fruit appeared to contain slightly more vitamin C than the unsprayed.

Tests were also made to determine the effect of storage on vitamin C. In 4 to 6 months of storage, at 36° F., Baldwin apples lost about 20 per cent of their vitamin C content; in 8 to 10 months the loss was nearly 40 per cent.

Freshly expressed Baldwin apple juice was found to be nearly as rich in vitamin C as the fresh apples. Little loss occurred during the first 24 hours after extraction. However, benzoated or pasteurized ciders, over 48 hours old, failed to retain an appreciable quantity of vitamin C.

Canned Baldwin apple sauce, either strained or unstrained, proved to be a poor source of vitamin C, the unstrained being somewhat superior to the strained.—C. R. Fellers, M. M. Cleveland, and J. A. Clague, *J. Agri. Res.* 46:1039 (June 1), 1933.

The Iodine Content of Hens' Eggs as Affected by the Ration—The common use of eggs in the human dietary, especially for infants and invalids, and the rather extensive use of iodine in the treatment of endemic goiter, make it desirable to have further information on the extent to which the iodine content of eggs is affected by the iodine intake of the bird.

Eighteen White Leghorn pullets were divided into 3 lots of 6 birds each. In addition to the basal ration, lot 1 received dried kelp, lot 2 iodized linseed meal, and lot 3 potassium iodide evaporated on dextrin. These products were fed in gelatin capsules in such amounts that each bird received 2 mg. of iodine daily.

After 4 weeks, the kelp feeding in lot 1 was discontinued, and the amount of iodine in the form of iodized linseed meal and potassium iodide was increased to 5 mg. daily, in the case of lots 2 and 3. The feeding of 2 mg. of iodine daily, either as kelp, iodized linseed meal, or potassium iodide, increased the iodine content of the egg approximately 75 times. When the level of iodized linseed meal and potassium iodide was increased to 5 mg. of iodine daily, the iodine percentage of the egg was increased about 150 times.

The amount of iodine in eggs is independent of the form in which it is fed to the bird, and the percentage of iodine

in eggs immediately decreases upon the discontinuance of iodine feeding.

The authors express the opinion that whether eggs of a known iodine content have a particular place in human nutrition depends upon whether the iodine requirements of the people of a given locality are provided from other sources. It is common knowledge that the natural foods and drinking water of certain sections are deficient in iodine, and that some form of medication must be resorted to in order to prevent and control endemic goiter, but how this can be best accomplished is an open question.—O. H. M. Wilder, R. M. Bethke, and R. P. Record, *J. Nutrition* 6:407 (July), 1933.

Specificity of Hexuronic (Ascorbic) Acid as Antiscorbutic Factor—After presenting a review of the literature both favoring and opposing the thesis that hexuronic (ascorbic) acid is itself vitamin C the authors describe certain experiments to ascertain whether antiscorbutic activity is an inherent property of hexuronic acid itself or due to some associated impurity. It was shown that the antiscorbutic activities of several natural sources of hexuronic acid, as, for example, ox suprarenal gland, were approximately proportional to the amounts of hexuronic acid recoverable from them. By biological assay specimens of hexuronic acid from different sources, such as suprarenal gland and paprika, were found to have identical antiscorbutic activity.

Tests of specimens of hexuronic acid of varying degrees of purity demonstrated that a given amount of hexuronic acid always had the same activity irrespective of the presence of impurities. Hexuronic acid after repurification and recrystallization always maintained its original activity.

A large variety of foodstuffs covering the widest possible range of biological activities were tested chemically for their hexuronic acid content. By experiment it was then found that the vitamin C value calculated from the known hexuronic acid content in all cases agreed with the value as determined biologically. The hexuronic acid content of lemon juice, orange juice and grapefruit juice was estimated by the intensity of ultra-violet absorption and the values obtained were in good accord with titration results and biological determinations.

With the knowledge that the suprarenals of normal guinea pigs had intense antiscorbutic activity and that this activity disappeared with the development of scurvy, experiments were conducted to demonstrate that the loss of antiscorbutic activity in the suprarenals ran parallel with the disappearance of hexuronic acid. A similar phenomenon occurred in the liver of the guinea pig.

Chemical tests on the suprarenals and livers of rats and dogs which are able to synthesize their own vitamin C when none is provided in the diet showed that the maintenance of vitamin C activity was associated with the presence of hexuronic acid. The authors further report that the conditions of aeration, heat and alkali which favor the destruction of hexuronic acid are the same as those which are known to determine the destruction of vitamin C activity.

Experiments with germinating seeds showed that hexuronic acid is synthesized concurrently with vitamin C activity by the plant on germination.

The authors conclude that hexuronic acid is itself vitamin C and they recommend the adoption of a specimen of hexuronic acid as an international standard of vitamin C activity.—Leslie Julius Harris and Surendra Nath Ray, *Biochem. J.* 27:580, 1933.

CHILD HYGIENE

Effects of Unemployment on Children and Young People in Belgium—*Report based upon findings of the Oeuvre Nationale de l'Enfance, Brussels. Richard A. Bolt, M.D., Dr.P.H., Oberlaender Award, Berlin, Germany.*

THIS report gives a very good idea of the number of young persons unemployed in Belgium, the effects of such unemployment, and the measures which have thus far been taken to prevent serious breakdown among the child population. In addition to the public health and social measures already applied, two new organizations were created to assist the unemployed. They were the General Relief Committee for Brussels and environs and the Central Assistance and Loan Committee for out-of-work employees.

Unemployment in Belgium is of too recent date, it seems to us, to allow of a serious study being made of its effects on children. On the other hand, the organizations created or subsidized by the Oeuvre Nationale de l'Enfance, the local or regional institutions and the private organizations are so numerous, and their work is so systematically planned, that one may hope to be able to prevent, or to palliate the effects that the unemployment of the parents may have on the physical and mental development and the moral and social attitude of the children.

Infants—From inquiries made among child welfare organizations, and from answers given by doctors and nurses, it would appear that, on the whole, the baby lacks for nothing—the baby is well cared for, because the parents are intelligent enough to make sacrifices for it. Child welfare propaganda has taught the parents how to keep their little ones in good health and to give them what they need, even at the price of personal discomfort.

This must not lead us to conclude that in Belgium no infant suffers through the weakness of the nursing mother or through the impossibility of giving it a prescribed diet. This is often the case, particularly among families already in straitened circumstances before the economic crisis and that the crisis has reduced to dire poverty.

The Oeuvre Nationale de l'Enfance notes a steady increase in the number of children cared for by its Child Welfare Centers and its Home Visiting Service. The figures have increased from 61,441 in 1929 to 78,064 in 1931. It would be a serious mistake, however, to attribute this rise to parental unemployment—at least, up to the present time; it is the result rather of child welfare propaganda. Indeed, it is legitimate to hope that the extension taken by child welfare work will permit of forestalling the effects of unemployment on the child.

Children of Preschool Age—These children, from 2 to 5 years old, include two categories: those who attend nursery schools, and those who do not. The latter, even in normal times, are not touched by the organizations; they are the "little unknown," who are no longer babies because "they eat everything," who have to be pleased with what is given them, and who have no means of voicing their troubles. The following observation, made in one of our big provincial institutions, throws light on the situation on these "in-betweens":

"They are brought to us in the belief that they are ill; they are only badly fed. It is sad to hear them crying, because, after all, we must let them go back to their families. And the parents again give them the same food as the older children, which is not suited to them at all. There is no compensation in the sacrifice of the parents, who give them a copper or two to buy sweets to make up for an unsuitable meal."

Children of School Age—Among older children the situation is less serious. There are, of course, many who lack supplementary food (weakly children) or the substantial nourishment (children of a large family) they are in need of, but such cases are known and supervised. They are given meals by the school organizations, who are doing really excellent work. School kitchens function in most important centers, but it is none the less true that the weakly and the undernourished must be sought out. Such children exist, not only as in the past among the population customarily dealt with by the Oeuvre Nationale de l'Enfance, but also among

families that never thought they would one day be forced to appeal to a charitable organization and that only resign themselves to do so when they are at the last gasp.

The children of school age benefit by school holiday camps, both at the seaside and in the country. In 1931 the Oeuvre Nationale de l'Enfance received into such institutions 6,592 children, totalling 514,476 days' maintenance. In 1932 the Oeuvre Nationale de l'Enfance paid particular attention to applications made by out-of-work families. Out of a total of 9,884 children admitted into its various institutions (up to October 1), 1,057 were children of the unemployed, chiefly from Brussels and the provinces of Hainaut and Liege.

Special measures against unemployment have been suggested and some of them have been put into operation. The following are the most important:

The Socialist Workers' Central Council has suggested the opening in every library of a special reading-room, the arrangement of debates, study groups, courses of lectures, walking or cycling tours, visits to industrial, social and educational institutions, as well as local study weeks or fortnights. The Trade Union Federation of Charleroi has established additional training classes.

M. Renard, Permanent Deputy of Brabant, suggested an extension of the school age or, at least, attendance at regular technical courses for pupils about to leave school. For apprentices proper, who are already on the dole, attendance would be compulsory and a return for cash received.

M. E. Veuchet, Inspector General of Technical Education, Province of Hainaut, proposed that the worker should be taught trades similar to his own, especially the small jobs of everyday life, the original trade remaining of course the main subject. The unemployed of overcrowded branches could be taught trades which are less popular.

M. Damoiseaux, Governor of Hainaut, and M. Pasteur proposed in addition to a policy of public works absorbing large numbers of unemployed, the extension of the school age to 16 for both boys and girls attending elementary, technical and domestic schools; and for young persons between 16 and 19, attendance at special technical courses.

In 1930, Mme. Plasky, Principal Inspector, Ministry of Justice, Labor and Social Welfare, suggested forbidding factory work for girls between 14 and 16, and introducing compulsory apprenticeship in sewing, dressmaking or housekeeping.

These suggestions led to the drafting of two bills laid before Parliament by M. Masson in 1931. The first proposed that girls of 14 years should have 2 additional years of domestic economy; the second provided penalties for infractions of the law (to be voted) forbidding the employment of women and children, and also of their period of domestic training. Serious opposition, however, was raised on account of the alleged need for female labor in certain of the industries.

Unemployment seems to be more serious for the young men than for the young girls; for wherever the kind of work permits, the young girl is preferred, since she accepts a lower salary, does equally good work and is often quicker and more accurate than the young man.—

Children, Young People and Unemployment. Part I, Belgium, pp. 93–106. Published by The Save The Children International Union, 1933. 15 Rue Levrier, Geneva, Switzerland.

PUBLIC HEALTH NURSING*

Echoes from the I. C. N.—American nurses are still wending their way homeward from the International Congress of Nurses which began in Paris, July 7 and ended in Brussels, July 15.

Over 2,000 nurses from 42 countries registered at the Congress.

The seven new countries admitted to membership before an enthusiastic audience in the great Trocadero in Paris were: Austria, Czechoslovakia, Estonia, Iceland, Japan (including Korea), and Hungary.

Some special topics of discussion were:

Mental Hygiene—Experience in psychiatry and mental hygiene was recommended as part of the basic training of every nurse. Miss Taylor of Yale University advised that schools of nursing be discontinued in mental hospitals because most of the care required is of custodial nature. Training in general hospitals which have the stress of mental factors emphasized directs the attention of the nurse to the whole human being.

A delegate from Finland said that her country had improved the mental hygiene teaching of its nurses by insisting that the supervisors and superintendents in mental hospitals be properly prepared for their work by post-graduate courses.

The recommendation was made that the mental hygiene committee of the I. C. N. consider further the development of under- and post-graduate courses in mental hospitals and the development of post-graduate courses for teachers of mental hygiene.

Supply and Demand—It was brought out by an American nurse that satisfactory maintenance of community health would entail the employment of 53,000 public health nurses in the United States, when actually there are about 16,000 employed.

If student nurses in hospitals were replaced by graduate nurses, 70,000 of the latter would be needed to maintain good nursing service in these institutions.

Bulgaria and India reported a shortage of trained nurses.

Nurse Journalists—The Editor of the *British Journal of Nursing* reported a dearth of suitable women for posts open in journalism. It was brought out that the first requisite for journalism is " the ability to write clearly of things felt, heard, and imagined."

State Supervision of Nursing—The Grand Council recommended that state registration of nurses be instituted in all countries, that registration be made compulsory, and that nursing schools be adequately inspected. It was suggested also that good standards of nursing could not be upheld without the support of the medical profession.

Public Health Nursing (Emphasized at the Brussels Meetings)—A Canadian delegate urged that nursing education be interpreted in terms of *end results*. " Exact hours of theoretical instruction and exact hours of ward practice are not measures of education. Judgment must be based rather on qualitative results. Was the theory well integrated with practice to give the ideas color and meaning? "

A delegate from Brazil thought that all public health nursing should be administered through government bureaus,

* Please send printed matter or other material relating to public health nursing to Eva F. MacDougall, 6 State House Annex, Indianapolis, Ind.

as is done in her country, where it is acknowledged that public health nursing "should be an official service, like the public schools."

Miss Goff, the nurse representative on the Health Section of the League of Nations, speaking for Mary E. Gardner, read the following recommendations on public health: "(1) That an international clearing house be established at the I. C. N. headquarters; (2) that preparation for public health nursing be worked into the basic course; (3) that refresher courses be arranged for all public health nurses; (4) that nursing texts be revised to include preventive and social aspects."

New Officers: *President,* Miss Lloyd Still, Matron and Superintendent of Nurses at St. Thomas' Hospital, London (Great Britain); *First Vice-President,* Miss Clara D. Noyes (United States); *Second Vice-President,* Miss Bella Alexander (South Africa); *Treasurer,* Miss Ellen M. Musson (Great Britain); and *Secretary,* Miss Christiane Reimann (Denmark).

The next Congress will be held in London in 1937.—Paris—Brussels in Retrospect—*Trained Nurse & Hosp. Rev.* LXLI, 2:114, 117, 123, 125, 133, 134, 135, 139 (Aug.), 1933.

The Public Health Nurse and the Federal Government—Federal recognition of the need for standards in public health nursing is seen in an editorial preface to a reprint just issued by the Public Health Service of the United States Treasury Department.

The reprint is of "The Objectives in Public Health Nursing" and "Minimum Qualifications for Those Appointed to Positions in Public Health Nursing." The "objectives" and "minimum qualifications" were printed first in *Public Health Nursing* after their determination by committees of the National Organization for Public Health Nursing working in connection with committees of the American Public Health Association. The editorial note follows:

> Since public health nursing has assumed a definite and important place in modern public health programs, it would seem desirable that the objectives of public health nursing be outlined and the qualifications of the public health nurse be tentatively set as an approach to standardization. As of especial interest, therefore, to public health administrators and to those desiring to enlist their services in this specialized field of nursing, there are presented here two articles dealing with objectives and qualifications. These articles are published not with the suggestion of finality but rather as points of departure for future development based on experience and attainable ideals in the important field of public health work.—

N.O.P.H.N. *News Release,* Aug., 1933.

Two of Our Nursing Leaders Are Doing Their Bit—Sophie C. Nelson, President of the National Organization for Public Health Nursing, and Lillian D. Wald, President of the Henry Street Visiting Nurse Association and Honorary N.O.P.H.N. President, have just accepted appointments to serve with Mrs. Franklin D. Roosevelt and some fifty other leaders on the National Women's Committee for the 1933 Mobilization for Human Needs, the nation-wide welfare appeal. Miss Nelson is the only member of the Committee from Massachusetts.—N.O.P.H.N. *News Release,* Aug., 1933.

Good for New Mexico!

Budget hearings this year have been enlightening and a pleasure to attend. At a time when the common cry has been lower taxation—when worried county commissioners, school board members and city councilmen have faced the problem of balancing their county's or city's budget, the pioneer spirit of individual service and sacrifice for the common good, has prevailed.

In Otero county a rising vote of men and women, all of them taxpayers, who were attending the preliminary budget hearing, indicated that they preferred a full term of school and the services of a public health nurse to lower taxation by disproportionate

reduction in the program for the education and welfare of their children.

In one county the commissioners after reducing every item in the budget, reduced their own salaries 20 per cent—But—there was no thought of discontinuing the nursing service.

In another county, no appropriation was made for the nursing service when the preliminary budget was prepared. When the final hearing was held, advisory nursing committee members and other interested lay people, all of them taxpayers, demanded that an appropriation be made for the nursing service.

In still another county which does not support a nursing service, the city attorney, representing the county seat, offered $400, office space, water and light, if a nursing service could be secured for that county.

At another hearing four superintendents of schools attended the health budget hearing and pledged their financial support to the service that they considered essential to the promotion of health and sanitation in their schools.

What is happening in New Mexico? Just this—through the health education programs of the public health nurses our people are becoming public health minded. Health education in the schools, home visits, classes in home hygiene and care of the sick, and other phases of the excellent public health nursing programs being carried by the New Mexico nurses have brought the work of the nurses before the people. Advisory nursing committees deserve much credit. The members have attended meetings, advised and assisted the nurses, and last, but most important, they have interpreted the work to their neighbors. Publicity given to an adequately rendered public service will eventually cause a demand for more of this service. Here's to New Mexico's Public Health Nurses! To them go the credit and the glory for the demand for the nursing services at a time when they are most needed, when lack of funds causes county commissioners and taxpayers many a sleepless night.—

Elenor L. Kennedy—The Nurses Page —*New Mexico Health Officer* III, 3:7 (Aug.), 1933.

EDUCATION AND PUBLICITY*

Education and Publicity Headquarters—When you wish to find someone to talk to about health education and publicity at Indianapolis drop in at our Headquarters. We will be better situated than at Washington.

Hundreds of questions can be answered by the classified portfolios on display. There will always be fellow workers present ready to exchange ideas and experiences.

Surely People Are Making Wills—And bequests are being planned whatever may be the general economic situation. *Will your agency be among the elect?*

A good job of bequest seeking calls for much careful preparation. As a first step could a board member or other volunteer, with or without the collaboration of a staff member, look into the matter and make recommendations as to the next steps?

A detailed outline of methods, with sources of information, is a 7-page memorandum, "Bequests and Trusts," issued by Social Work Publicity Council, 130 East 22d St., New York, N. Y. *6 cents; 2* or more copies, *5 cents* each.

Have You a List for Indianapolis?—Expense accounts are likely to justify most for those who list in advance some questions to be answered, and some problems to be discussed. At least one question to be asked, one problem to be talked over, one idea to be passed on, will give point and purpose to one's

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York, N. Y.

attendance at the A.P.H.A. October meeting in Indianapolis.

The Psychology of Health Education—This is the theme for the Health Education Institute, Indianapolis, Oct. 7–9, 1933:

Its application to mass education and its utilization in the written and spoken word and to the graphic media.

The faculty: Dr. Iago Galdston, Dr. H. E. Kleinschmidt, Bertrand Brown.

The outline:

a. Why the psychology of health education?
b. The psychologic nature of the recipient of health education.
c. Fundamental principles relative to:
   1. Arresting attention
   2. Enlisting sympathy
   3. Imparting information
d. Meaning and mechanism of motivation.
e. Practical demonstrations; the application of the outline of psychologic principles to health education instruments; the spoken text, the printed text and graphic material.

Applications: to American Public Health Association, 450 7th Ave., New York, N. Y.

Too Many Ideas on the Air?—The pleader for public health is tempted to cover too much ground, to try to tell too many things, without telling enough on each point to make it clear to the diverse audiences reached by radio. Examples and other illustrations and comparisons will add interest as well as understanding. To state a situation as it will be met by a health department will mean more to the listener than the assertion that the health department will surely handle such a situation.

One idea, one argument, one illustration, any one point lodged in the minds of radio listeners means more for the local health department than any well rounded review of all that the department does and all the reasons for its maintenance.

Let's concentrate and clarify *and* convince.

Are Radio Talks Too Casually Presented?—The summer's output of broadcast appeals for maintenance of health department work show that we can get time on the air. The broadcasts do not show that we are willing to pay the price for holding the audience.

The subject, the sponsorship, the well known participants, each draw their share of audience. But it is up to the participants to hold and to convince that audience. Even a newspaper reader is probably less fickle than the radio listener.

Most of all do we need a bit of showmanship in our broadcasts. Whatever we say will interest and convince if well presented. Rehearsals before unafraid critics are almost essential to success. The individual broadcaster should become familiar with the *sound* of every word of his manuscript. Emphasis and tone of voice should be studied and marked on the manuscript.

Where two or more participate in a discussion, individual familiarity with the *sound* of the words should be followed by joint rehearsal. Here a good director of amateur theatricals could be brought in to advantage. He should be expected to be as hard-boiled as when holding a play rehearsal. He should be expected to see that our health talkers get their lines over to an invisible, but very real and very human audience.

Big names, prominent sponsorship, and importance of the topic will not put put over an unprepared presentation.

Is "Per Capita" Convincing?—A few weeks ago "50 cents per capita" was emphasized in a radio talk. Not long ago national "per capita" costs of some $4 or $5 each for fire and police protection were compared with the much smaller national "per capita" cost of public health services. Who is "per

capita"? What are counted? What is the relation of "per capita" to the individual tax-payer? *Are we clear? Are we convincing?*

Comparing national "per capita" costs for public services has little meaning, and less force in relation to costs in "our town."

And how can the small town listener keep his attention on the argument for public health services when we bring in comparisons with expensive "per capitas" for fire and police protection of which he has so little.

May those who write and those who speak give earnest attention to how to make "per capita" significant and convincing.

Health Education—The following are listed in *Library Index*, 450–7th Ave., New York:

Allen, E. H., M.D. Promoting health consciousness through visual education. School physicians' bulletin (Albany), 3:9–11, June, 1933.

Barber, S. R. Quelling the quacks. Part IV. *Hygeia* (Chicago), 11:407–10, May, 1933.

Common sense in health propaganda. *American Journal of Public Health* (New York), 23:478–79, May, 1933.

Goldstone, Rose. Our kindergarten health project. *American Childhood* (New York), 18:11–12, 44–45, May, 1933.

Lane, P. W. Today's program in health education—and tomorrow's. *Nation's Schools* (Chicago), 12:13–18, July, 1933.

Mackintosh, J. Health exhibitions. *Mother and Child* (London), 4:124–28, July, 1933.

Normington, Flavilla. The school lunchroom—an important cog in the teaching machine. *Nation's Schools* (Chicago), 11:45–48, April, 1933.

Streit, W. K. Interpreting the health and physical education program to the public. *Journal of Health and Physical Education* (Ann Arbor), 4:36, 62, May, 1933.

Teaching health. *Hygeia* (Chicago), 11:457–60, May, 1933. A health day program in a one-teacher school, by Mary Westcott.—Health for a nickel, by J. P. Godfrey.—Correcting remediable physical defects in junior high school, by S. P. Prenn.

Teaching health. *Hygeia* (Chicago), 11:742–45, August, 1933. The senior high school teacher observes her pupils, by R. E. Shuchowsky.—A clean-up project in a rural school, by Jewel Nolen.—The health house helps to build health habits, by Eva Nelson.

Whitney, Anne. Health education—whither bound? *Journal of Health and Physical Education* (Ann Arbor), 4:3–5, 39, May, 1933.

We Should Know Them—Two new committees of the National Conference of Tuberculosis Secretaries are of interest to this department:

Child Health Education: Edna Bond, Newark, N. J., chairman; Jean Latimer, Boston, Mass., Mrs. Blanche de Koning, Grand Rapids.

Health Education: Robert W. Osborn, Buffalo, chairman; William F. Higby, San Francisco; Rowan Whealdon, Newark, N. J., secretary; Dr. Henry D. Chadwick, Detroit, medical consultant; Dr. Iago Galdston, New York, staff adviser.

A Use for Your Photographs—They may not be "cure" pictures but they may illustrate a situation or an idea suitable for *Journal of the Outdoor Life*, 450 7th Ave., New York, N. Y.

The Journal of the Outdoor Life pays a slight honorarium for any photographs suitable for publication submitted by its readers. They are judged (1) according to their subject matter, namely, human interest scenes dealing with some phase of cure-chasing, whether at home or in a sanatorium, and (2) for their technical excellence and reproducing qualities. Please secure written permission from anyone whose picture you are submitting and tell us where it was taken.

By the way if you have not seen the new *Journal of the Outdoor Life*, you will wish to ask for a sample copy to see the transformation due to careful planning of paper, typography and pictures.

The "Women's Crusade" for Human Needs—A nation-wide educational movement being organized to supplement the fall and winter community chest fund raising campaigns, as well as to supplement all legitimate efforts for the maintenance of essential health and other welfare services, public as well as private, will affect health work.

This is the Women's Crusade, the National Women's Committee of the 1933 Mobilization for Human Needs. Newton D. Baker is chairman of the National Citizens' Committee, and Mrs. Franklin D. Roosevelt, chairman of the National Women's Committee, with headquarters in Room 1815, Graybar Building, New York, N. Y.

Inspiration for the plans offered to local committees comes from the Women's Crusade which so notably supported the April, 1933, campaign of the Cincinnati Community Chest.

The purpose of the Women's Crusade is educational, not financial. It seeks to interest more women in the welfare work of their communities; to help women understand its problems and aims, especially as these have been affected by recent changes; and to guide women in stimulating public opinion toward a generous meeting of human needs through their local fund-raising agencies.

These aims are to be accomplished through informal discussion, public speaking, answers to criticism, distribution of literature, and other measures as agreed upon with the local community chest or other welfare campaign, of which the Women's Crusade should be a closely linked part.

The immediate purpose is to provide an educational background for local community efforts to raise funds for the agencies not supported by taxes. Incidental to this purpose it will be necessary in many communities to interpret the needs, resources, and relationships of the public agencies. And it may be expected that later the same local Crusade groups, with their understanding of community problems, and their fine enthusiasm for service will be available as the public services face critical situations.

Local health workers may well get in touch with the local Crusade groups as they are organized. If organization is delayed write to the National Women's Crusade Committee stating the situation and suggesting capable women for local leadership. A copy of the Crusade handbook will be sent upon request to the National Women's Committee without charge to the local leader. Price to others, *10 cents;* special price for quantities.

Eight of the coöperating national organizations are concerned with public health.

Why Not?—This from *Public Health Nursing*, New York (Sept., 1933):

In examining school children why send a note home to the parents only when there are defects? Why not also when the child is in good condition? This has been tried in several places with excellent psychological effect on the parents. For example—"John was examined by the school physician today and was found to be in excellent physical condition. You are to be congratulated on the good care you are giving him and trust you will continue it." Can't you see the parent swelling with pride at this; and also the envious glances of neighboring parents whose children *had* some defects, and the subsequent scrambling on their part to get the defects corrected as soon as possible?

This is one of the many valuable points brought out in the Health Education Conference held in Ann Arbor, Michigan, in June, under the auspices of the American Child Health Association.

Health Advice in Newspapers—The "Annual Directory of Features"

(*Editor and Publisher*, New York. Aug. 26, 1933. *10 cents*) lists the following:

"Health," Dr. Morris Fishbein; "Health," Dr. Copeland; "Health Column," Dr. W. A. Evans; "Health Column," Dr. Logan Clendening; "Health Column," Dr. Iago Galdston; "Health and Beauty," Dr. Sophia Brunson; "Health, Heart and Home Page," unsigned; "Here's to Your Health," Dr. Frank McCoy; "How I Keep Fit," Celebrities; "How's Your Health," Dr. Iago Galdston; "How to Reduce Without Dieting," Lilyan Malmstead; "Secrets of Health and Success," Dr. Louis E. Bisch; "That Body of Yours," Dr. James W. Barton; "Your Child's Health," Dr. Michael Shuman; "Your Eyes, Ears, Nose and Throat," Dr. H. Hoare; "Your Good Health," Dr. Claud North Chrisman; "Your Health," Dr. Royal S. Copeland; "Your Weight and Your Height," Dr. James W. Barton.

In addition, classified under "Food" are the following and others:

"Eat and Grow Thin Diet," Dorothy MacLennan; "Food and Health," Dr. Shirley Wynne; "Mrs. Babe Ruth's Diet"; "Pure Food Articles," Dr. Royal S. Copeland; "Thirty-Day Diet."

The lists are given here to show the extent and the sources of the material sold to daily newspapers in the United States and Canada. The contributions classify as good, not so good, indifferent, and bad.

In Hygeia for September, 1933—are the following—and other articles:

"Football Injuries"; "Colleges and Health"; "Are They Ready for School?" "Removing Rural School Handicaps to Mental Accomplishments"; "The Mother and the School"; "Sex Education": Part III; "What Your Child Eats at Noon"; "Can School Days Be Safe Days?" "Training for Athletics and Health"; "Progress in Preventive Medicine"; "School and Health" (including "Projects in Teaching Health Originated by Southern Illinois Normal University"); "Let Us Go to the Foot Carnival"; "Building a Health Village"; "Let History Live!" "Pigs Help to Teach Hygiene"; "Combining Music With Health"; and "New Health Books and Teachers' Materials."

EDUCATIONAL MATERIAL

"What Builds Babies? The Mother's Diet in the Pregnant and Nursing Periods." Children's Bureau, Washington, D. C. 7 page folder. Revised edition. Single copies *free*.

"Mother's Milk — Summer Complaint," reprinted from *Hygeia*, June, 1923 and June, 1933. American Medical Assn., 535 N. Dearborn St., Chicago. 32 pages. *15 cents;* quantity rates. Popular and practical; several attractive illustrations.

"Appendicitis." John Hancock Mutual Life Insurance Co., Boston. 5 small pages. *Free*. Explains and emphasizes the following:

In the presence of abdominal pain, give nothing by mouth. Never give laxatives. Apply an ice pack. Call your family physician. Abdominal pain which persists over a period of 6 hours is usually serious.

"Milk for the Family." *Farmer's Bulletin* 1705. 30 pages. Supt. of Documents, Washington, D. C. *5 cents*. Probably *free* from Dept. of Agriculture, Washington, D. C. Supersedes "Milk and Its Uses in the Home." Values of, choosing, home care of milk, etc.

"Children's Bureau and Other Publications Relating to Children." Supt. of Documents, Washington, D. C. 15 pages. *Free*. Classified list of U. S. Government publications.

"Salt for Oral Health," by H. T. MacDonald. *Health*, Canadian Social Hygiene Council, 105 Bond St., Toronto, Ont., June, 1933. *15 cents*. "Ordinary table salt seems to fulfil the requirements of a good dentifrice. Here is the story of why this is true."

Have you passed on to local outdoor recreation leaders the article on "Loss of Actinic Sunshine as a Health Problem of Cities," by Dr. F. O. Tonney (in August, 1933, *Journal*)? Of course, marking the second suggestion on page 780. An editorial writer on one of your local newspapers might welcome an

opportunty to discuss material in that article.

Nutrition Notes, issued September to June, is a little publication of great value to those who desire "brief mention of newer findings in the field of nutrition, with suggestions for feeding families at low cost." *50 cents* a year; *8 cents* a copy. Nutrition Bureau, A.I.C.P., 105 East 22d St., New York, N. Y.

We have been favored with a set of post cards on the prevention of accidents, issued by Instituto de Reeducación Profesional, Madrid, Spain. The illustrations show that many accidents in Spain as well as in the United States result from carelessness as well as the lack of safety devices.

Single copies only to health workers outside the state will be supplied by Massachusetts Dept. of Public Health, Boston:

"Why Be Vaccinated?" 4 pages, with several striking diagrams.

"Food for the Teens." 8 pages. What foods are sources of this and that; 3-page table of the form in which specified foods may be eaten and their values; table of calories; etc.

"Caring for Teeth" and "Eating for Teeth." 2 pages.

"The Permanent Teeth." 2 pages; 2 diagrams.

"How to Judge Nutrition of Children." 1 page. "The well nourished child shows . . ."

"The Control and Prevention of Rabies." 6 pages.

"Good Eating Habits." 4 pages. Habit training; how to make certain foods more acceptable.

"Recipes for Cracked Wheat." 1 page.

"Epidermophytosis (Athlete's Foot): Its Prevention and Treatment." 5 pages.

Metropolitan Life Insurance Co., New York, N. Y., and Ottawa, Ont., will supply the following:

"The Custodian and the School Child." 16 pages. The janitor as a health worker.

"Tonsils and Adenoids. Is Your Child Handicapped?" 4 pages. Delightful child face on the cover.

"Your Little Child Goes to School. A Message to Fathers." 8 small pages. At last "father" is getting his share.

"The Safe Walker's Memo Book." 16 pages, partly blank. Red and black diagrams on walking in city and country. "When the pages have been filled, the local representative of the Metropolitan Life Insurance Company will be glad to furnish a new booklet."

"The Real Driver's Log Book." 18 small pages. Pages for recording your trip; text and illustrations on "The Art of Driving."

"Check Your Car for Safety and Performance." 22 small pages. Blank forms for records; text and series of questions as to safety precautions for car owner.

"Protection of Workers Exposed to Chromium and Its Compounds." 15 pages.

"Organizing for a Traffic Survey." 24 pages.

"Studying the Movement of Vehicles." 24 pages.

"Finishing the Job in Diphtheria Prevention," by Donald B. Armstrong. 6 page reprint. What more to do in New York—and elsewhere.

"The Tuberculosis Movement Today," by Donald B. Armstrong. 5 page reprint.

Again comes "Statistical Report of Infant Mortality for 1932 in 955 Cities of the United States," issued as usual by American Child Health Association, 450 7th Ave., New York, N. Y. 31 large pages. Single copies *free.* The interpretive comment adds much to its value for use in publicity.

"Reducing the Public Health Budget" was presented over an NBC-WJZ network on Sept. 5. George F. Canfield, Dr. Matthias Nicoll, Jr., and Dr. Kendall Emerson were the participants. Copies of the discussion for *15 cents* from National Municipal League, 309 East 34th St., New York, N. Y.

Readers of this department who serve on the firing line in the actual production of copy will find serviceable background material in every issue of the *Journal.* Not to be overlooked is "A Selected Public Health Bibliography With Annotations," edited by Dr. Raymond S. Patterson.

"Services the Health Bureau Renders to the Public and Physicians" is a three-page tabulation classified under 20 headings. Quite a worth while idea for, say, once a year in the house organ of the public or private agency. *Bulletin,* Health Bureau, Rochester, N. J. July, 1933.

"Syphilis" was the subject of a broadcast over WFEA, Manchester, N. H., by Dr. H. W. N. Bennett, State Board of Health Clinic. Reproduced in *Health,* State Board of Health, Concord, N. H. July, 1933.

What is probably a fairly common phase of the rat problem is illustrated on the cover page of *Municipal Sanitation,* 24 W. 40th St., New York, N. Y. Aug., 1933. *25 cents.* Photographs of similar dump piles could be used effectively in calling attention to such situations: "Water, food and shelter, and ideal layout for developing a plague of rats."

SCHOOLS AND CHILDREN

To those concerned with health teaching in the schools: re-read the first two paragraphs under "Health Education Conference at Ann Arbor," page 873, in the *Journal,* Aug., 1933.

The third issue of *Spyglass* was issued Sept. 15 by American Child Health Assn., 450 7th Ave., New York, N. Y. *75 cents* for 4 issues.

"This periodical for children will help them bring into focus with their everyday living and health problems, important and useful information from a variety of sources.

The September issue contains timely material suitable for use in connection with the fall health activities in the schools. Illustrated.

Some of the school health articles in *Public Health Nursing,* 450 7th Ave., New York, N. Y. (Sept., 1933. *35 cents*):

"A Health Program in a Private School"; "Evaluating the Home Visit"; "First Aid as It Affects Nurse or Teacher Load."

Significant features of the Seventh Health Education Conference, at Ann Arbor last June, are brought out by Anne Whitney in *Child Health Bulletin,* American Child Health Assn., 450 7th Ave., New York, N. Y. Sept., 1933. The Conference "was unique in that it did not go on record as endorsing any formal resolutions or statements."

Two reasons for this might be suggested. First, the recent White House Conference on Child Health and Protection has crystallized for those working in health education a vast amount of material which offers a substantial body of standards and principles useful for many years to come. Second, the unpredictable elements in our present social and economic conditions have given workers a realization of a need for clear thinking and for flexibility in adaptation to changed conditions.

The same issue of *Child Health Bulletin* includes: "The Relation of Food to Health," by Mary Swartz Rose; "Coöperation in Health Work," by Kendall Emerson; "Health Education of Teachers: Some Trends in Their Preparation," by Ethel M. Mealey; "Evaluation of School Health Procedures," by George T. Palmer; "Child Health Literature," a bibliography of current material; "The Care of the Mother Before the Baby Comes—And Afterwards," references selected by Clara E. Hayes. The two sections, "For Parents" and "For Physicians and Nurses," are each divided under "Single Copies Free" and "Books and Pamphlets to Be Purchased Directly from Publishers or Local Booksellers." This last is a new and helpful addition to the details which characterize A.C.H.A. reference lists for making them easily usable.

This from the mast-head of *Safety Education,* 1 Park Ave., New York, N. Y., expresses the standard set up for safety work with children:

Life is made up of adventures; even crossing the street is an adventure! Some adventures are good and necessary. Others are

stupid and futile. Some bring the more abundant life. Others bring only waste of life and the material resources of life. . . . All adventures involve uncertainty and danger. A danger courageously met and intelligently controlled is part of the substance of a normal life. A danger carelessly met and ineffectively controlled results in defeat of purpose and even in tragedy. . . . This magazine is primarily for the use of schools in helping children choose their adventures wisely and in helping them carry these adventures through intelligently.

PLAYS

"Chasing Germs." *Jamaica Public Health,* Kingston, Jamaica. Sept., 1933. Real folks; no fairies, no impersonation of germs!

"Three Pairs of Shoes," by Marion Holbrook. *Safety Education,* 1 Park Ave., New York, N. Y. Sept., 1933. *10 cents.*

MAGAZINE ARTICLES

"The Baffling Struggle Against Tuberculosis," by Dr. Kendall Emerson. *Literary Digest,* New York. Sept. 2, 1933. *10 cents.*

"Beauty Without Bunk," by Dr. Ruth F. Wadsworth. *Collier's.* July 29, 1933. "Real beauty culture encourages Nature instead of attempting to improve it."

YOU MAY BE INTERESTED

Those who are doing industrial health work will wish to get acquainted with *Industrial Medicine,* 844 Rush St., *Chicago.*

"In keeping with the spirit of the times this report was inexpensively prepared" in mimeographed form, says The Brooklyn Tuberculosis and Health Assn., 293 Schermerhorn St., Brooklyn, N. Y. Pages are 5½ by 7½ inches. An effective page appeal for bequests—so frequently omitted. It is interesting to note that $26,613 of the $79,829 budget went for "Health Education and Promotion," the details of which are listed.

The September, 1933, convention of American Hospital Assn. included a "Round Table on Public Relations" with a "Report of Public Relations Committee," "Discussion of Proposed Program of Public Relations for Ensuing Year," "A Practical Basis for a Public Relations Program," "Presentation of Complete Public Relations Program," "Educating the Public Through Lantern Slides and Motion Pictures," with demonstrations. The "Round Table on Administrative Problems" included "How Can the Public Be Educated as to the Cost of Good Hospital Service?"

"Empire Health Week," announced for Oct. 1–7, 1933, established in England in 1912, has been observed in Jamaica since 1923. *Jamaica Public Health, Kingston,* says that

"Empire Health Week has been observed in Jamaica since 1923, and each year has shown an increase in the number of communities which have carried out programs of health education. And each year more and more people have during this week given consideration to questions of hygiene and sanitation at homes and schools. Doctors, preachers, teachers, lawyers, planters, officials and leading citizens have taken part and given talks on disease prevention. It is worthy of note that schools in every part of the Island have year after year prepared special programs, and in other ways taken an active part in carrying health teachings into the homes of each district. The topic of special study for Jamaica for the Health Week of 1933 will be Safe Water."

BOOKS AND REPORTS

Tuberculous Disease in Children: Its Pathology and Bacteriology—*By John W. S. Blacklock. London: His Majesty's Stationery Office,* 1932. 155 pp. Price, $1.00.

This highly interesting special report of the Medical Research Council by a student of the pathology of adult tuberculosis is an attempt to throw some light upon the paths of infection, their correlation with the type of tubercle bacillus, and the relative importance of air-borne and food-borne infections.

The author's material consisted of 283 cases of naked-eye evidence of tuberculous infection among 1,800 consecutive autopsies and 65 cases of surgical tuberculosis. Of the 283 children autopsied, over 90 per cent died from tuberculosis and the organism was isolated in 183 instances. Of the cases of surgical tuberculosis, 52 strains were isolated from 65 cases. In all, 241 strains were isolated (152, 63 per cent, were human type). Relatively fewer males (13.9 per cent) than females (19 per cent) showed lesions of tuberculosis and from the second year onward the percentage was always higher in females.

Among the 283 cases the site of the primary infection was considered probably to be thoracic (lungs or lymphatic glands) in 61 per cent, most frequently situated in the right upper lobe, which was difficult of explanation. When the primary infection was in the abdomen, bovine bacilli were found in 82 per cent; when in the lungs, human bacilli were present in 97 per cent. One-third of the children with bone and joint tuberculosis had a bovine infection and among all the children with bovine infection such lesions were 13 times as common as among those with primary thoracic tuberculosis.

Air-borne infection is more common in cities, and 86 per cent of the children with primary thoracic tuberculosis lived in cities.

> Thus from the pathological, histological and bacteriological points of view, the primary lung lesion would appear to be, indeed, such and due to direct infection of the lungs through the air passages. We do not deny—and, as a matter of fact, have shown—that in some cases of primary abdominal tuberculosis severe pulmonary lesions may be found, but these are of a secondary nature.

The author feels that in Scotland, in marked contrast to the experience in America and on the Continent, nearly all children with tuberculous lesions in the lungs or tracheobronchial glands die in childhood from tuberculosis. It is possible that the Scots are less resistant than many other races.

In 101 cases (36 per cent) of the 283 coming to autopsy and dying from tuberculosis, the primary lesion was probably in the intestines. In 18 under 5 dying from tuberculosis all had intestinal ulceration. All such cases under 1 year had been fed on cow's milk. The greatest number of primary abdominal lesions were found in the second year of life, that is, at the period when children are consuming large amounts of raw milk. From these abdominal lesions, 12 human and 54 bovine strains were isolated, country children showing slightly more bovine infection, due possibly to the fact that the milk in Glasgow is pasteurized. From children dying from tuberculosis 165 strains were isolated, 73 per cent being human. The greatest percentage

of human strains as compared with bovine was found in the first 6 months of life, and in children from 5 to 13. The highest percentage of infections with bovine strains occurred in the second year of life, when most raw milk is consumed. There was some evidence to show that the bovine was less dangerous than the human strain. Probably both the situation of the primary lesion and the type of bacillus have something to do with the generalization of the disease which occurs more frequently associated with the human bacillus.

This valuable study has added many concrete facts to our still somewhat confused knowledge of childhood tuberculosis. It again emphasizes the importance of the bovine tubercle bacillus in the struggle against tuberculosis. It may be recalled that in 1901 Koch questioned this importance but modified somewhat his views in 1908. In the meantime Ravenel, Griffith and others had shown that for children, at least, the bovine bacillus was very dangerous.

Blacklock adduces convincing evidence that such is the case and even in America it has been estimated that 3,000 to 4,000 children die from the bovine tubercle bacillus annually. For man, Blacklock thinks he has shown that the bovine infection is less pathogenic than the human type but evidence is accumulating that at least in Scotland the bovine bacillus may be found in over 3 per cent of the cases of adult pulmonary tuberculosis, due, Griffith and Munro hold, to a late manifestation of a childhood, bovine, alimentary infection. Such patients rarely, they have suggested, infect others. Apart from the generalized tuberculosis occurring in the children with little resistance, Blacklock found pulmonary lesions are the most dangerous manifestation of tuberculosis. These are nearly always due to the human bacillus, from aerogenous infection. Bovine infection is more common in Scotland than elsewhere and apparently infantile tuberculosis is almost always fatal. He thinks it is very rare for dormant infection of childhood to flare up later.

It is impossible to give in a small compass the many important and suggestive facts brought out in this work. The book should be carefully studied by all who are engaged in health work and is particularly to be recommended to the workers in tuberculosis.

LAWRASON BROWN

A Standard Classified Nomenclature of Disease—*Compiled by the National Conference on Nomenclature of Disease. Edited by H. B. Logie, M.D., C.M. New York: Commonwealth Fund.* 701 pp. Price, $3.50.

This book is the product of coöperative effort by national organizations representing medicine, medical statistics, surgery, public health, and industrial hygiene; by the federal medical, health, and statistical services, and life insurance interests.

This nomenclature is a distinct advance over all nomenclatures that have preceded it; and it is a decided departure therefrom in that it provides for the classification of diseases on a dual basis, that is, etiological and anatomical. This makes it possible for hospitals to make statistical accountings of *all* the diseases affecting any organ of the body; and for the first time, hospital statistics showing both the site (except when unknown) and cause (except when unknown) of disease will become available.

The new nomenclature is divided into 11 anatomical divisions and 11 etiological categories. Leading specialists in all branches of medicine have given generously of their time to assist in its preparation. All acknowledge, never-

theless, the outstanding contribution which has been made by Dr. H. B. Logie in originating the dual form of classification and in preparing and editing the manuscript of the book itself.

The *Nomenclature* is to be kept abreast of the progress of medicine. This will necessitate revisions from time to time. For this purpose the National Conference on Nomenclature of Disease will continue to function and an executive staff will be maintained. Headquarters will be at the New York Academy of Medicine which has generously provided office space and working facilities since the Conference began its work.

The reception of the *Nomenclature* by clinical societies and hospitals has been most gratifying. More than twenty of the former have approved it formally. It is now in actual use in 71 hospitals, including many of the largest in the country; and its adoption is being considered by 238 additional hospitals. A number of large hospitals associated with leading medical schools are using it. Among these may be mentioned Harvard, Columbia, Yale, University of Pennsylvania, Western Reserve, Vanderbilt, Tulane, and the University of Chicago. More recently its use has spread to other countries, through its adoption by hospitals in Palestine and the Dutch East Indies.

GEORGE H. VAN BUREN

The History and Epidemiology of Syphilis—*By William Allen Pusey, M.D. Springfield, Ill.: Thomas,* 1933. Price, $2.00.

Anything from the pen of Dr. Pusey on syphilis is authoritative and written in a style which attracts. The present volume consists of three lectures given under the Adolph Gehrmann Endowment, and according to the author, are an elaboration of certain chapters of his monograph on *Syphilis as a Modern Problem,* written in 1915 as a part of the celebration of the Panama-Pacific Exposition at San Francisco. The changes consist chiefly of bringing the material up to date, since much new matter has come to our knowledge in the 18 years which have elapsed since that publication.

The book is written in Dr. Pusey's usual style, succinct and interesting. We have already said that it is authoritative. It is profusely illustrated, with old cuts and 26 photographs of well known men who have taken part in the study of syphilis and the elucidation of the problems presented.

The printing and make-up are excellent.

MAZYCK P. RAVENEL

Cancer and Other Chronic Diseases in Massachusetts—*By George H. Bigelow and H. L. Lombard. Boston: Houghton, Mifflin,* 1933. 355 pp., 135 tables, 12 charts, and 2 maps. Price, $4.00.

The shift in age classes in the population due in part to the reduction in infant mortality and to the growth of preventive medicine, is affecting the incidence and amount of chronic diseases to such a degree that the problem of hospital or other care for this group of persons is becoming a social, economic and medical problem of increasing importance.

The population over 50 years of age has increased about 1 per cent in each decade. Deaths from chronic diseases have increased from one-third of all deaths 50 years ago to two-thirds today. The duration of such diseases in persons over 50 years of age has increased 2.6 times in the last 20 years.

The time lost by wage earners due to chronic disease in Massachusetts annually is valued at $40,000,000. Chronic cases to the number of 55,000 occur annually in that state in homes wholly unable to care for them. This number would require 18,000 hospital

beds and an initial investment of $55,000,000 for their installation and $18,000,000 for maintenance, with a net cost to the state after estimated receipts are credited of $13,000,000—nearly one-third of the present cost of state government.

As alleviating factors, the following proposals are discussed: (1) a program of adult hygiene to be added to that of childhood and adolescence to constitute a health education program in schools; and (2) early diagnosis, especially in cancer. Discriminating short-term medical service is less expensive than indiscriminate long-term service to the ambulant invalid or to society. There are 138,000 cases of rheumatism in Massachusetts, of whom 70 per cent receive no medical care, and of whom 70 per cent could probably be benefitted by proper care.

About 12 per cent, or 500,000, of the population in Massachusetts are victims of chronic disease. Of these, 45 per cent are partially disabled and 5 per cent totally disabled. The incidence is 50 per cent higher among the poor than among the well-to-do.

The order of incidence is rheumatism (138,000), heart disease (84,000), arteriosclerosis (64,000), digestive diseases (29,000), eye and ear (24,000), apoplexy and tuberculosis (24,000 each), diabetes (15,000), and cancer (11,500). The duration varies from cancer at 21 months to rheumatism at 4 years. The fact that rheumatism cripples most and lasts longest makes it of preëminent social, economic, and medical importance. At present two-thirds of this group receive no medical attention. The reasons given for absence of treatment were (60 per cent) lack of confidence in medical treatment, (33 per cent) condition not regarded as serious, and (13 per cent) economic reasons.

The Massachusetts cancer program is reviewed in the light of 5 years' experience. This provided state-aided cancer clinics and a state hospital for treatment of the indigent and to stimulate more adequate diagnostic and therapeutic service.

The review indicates that the services of the best medical and lay citizens can be obtained to develop and guide a cancer program; that physicians respond to the educational opportunities and their patients to clinics and hospitals; that cancer patients come in large numbers to private agencies when informed; that earlier use of cancer diagnosis follows on importunity; that all methods of public information on cancer must be used unceasingly; and that under government direction clinic and hospital service can be developed of a quality not heretofore available. Similar services should be developed for other important chronic diseases.

This study was made by the Massachusetts Department of Public Health, and is based on a large volume of statistical information elaborated with skill and a notable completeness. Every public health official and worker should be familiar with its findings and ponder over it. CHARLES A. KOFOID

The Sanitary Inspector's Handbook. A Manual for Sanitary Inspectors and Other Executive Public Health Officers—*By Henry H. Clay. London: H. K. Lewis & Co., Ltd.*, 1933. 386 pp. Price, $4.00

This is one of the books which give joy to a reviewer. Prepared with the idea of supplying a textbook for students presenting themselves for the examination of the Royal Sanitary Institute and Sanitary Inspectors Examination Joint Board, it necessarily deals with English customs and laws. However, the book is soundly based on fundamentals and each chapter gives the reference to the Public Health Acts involved. It will not only be of much value to students in England and

Scotland, but to those in the United States, while every public health officer will find practical, sound sense based on fundamentals which are as true for America as they are for the British Islands. For example, early in the volume a chapter is given to "Powers of Entry." These powers are based on common law, as we understand it, but necessarily the statutes in England are different from those in our country.

From cover to cover the book is full of sound information which will be of great value to inspectors or health officers in this country and elsewhere as well as in England. In spite of these drawbacks, as they may be called, for the American reader, the book can be unreservedly recommended to all of those interested in inspection and enforcement of sanitary law.

It is excellently printed and well illustrated. There are chapters on vital statistics, useful memoranda and glossary of building terms, tables of measurement with their equivalents in different systems, etc., all of which add to the convenience of the reader.

MAZÝCK P. RAVENEL

Everyday Problems in Health—*By Frank Merrill Wheat and Elizabeth T. Fitzpatrick. New York: American Book Company,* 1933. 144 pp. Price, $1.20.

"A basic text planned for the scientific teaching of pupils either in junior or senior high schools" is a concise but inadequate description. My own description from a purely human point of view would be, "an absorbing book, presenting vividly subject matter of interest to every human being."

The book of 440 pages, including appendix, glossary and index, is not only an excellent basic text, logically arranged and carefully checked, but is also an unusually challenging presentation of problems of biology, public health and social relationships common and vital to everyone.

Divided into five units, Health and the High School Pupil, Eat and Live Healthfully, Putting Food to Work, The Control of the Healthy Body, Maintaining a Healthful Home, each unit is subdivided into Problems which cover a large range.

The book is written for high school students and is presented by authors who have such a keen interest and love of the human animal, not as a cut and dried subject, but rather as a living and thinking organism, that it seems inevitable that physiology, biology, and everyday living will be real and vivid experiences instead of lessons to be learned laboriously and perhaps distastefully.

This book meets a long felt need in high schools and will, I am sure, call forth from teachers and parents the remark which it called forth from me—"At last a health text which will bring results in better living."

JULIA B. TAPPAN

The Health School on Wheels—*By J. Mace Andress and I. H. Goldberger. New York: Ginn,* 1933. 399 pp. Price, $.76.

If any book can arouse the interest of children in public health, *The Health School on Wheels* should do it.

There is nothing new in the idea of sightseeing tours of a city, but to adapt them to one class of school and to specialize in the health promoting agencies of a large city is a suggestion with real merit. It may not be that every class which uses this book as a text can study at first-hand the aspects of community health as the children do in the story—in fact, relatively few cities have all the opportunities afforded by "Brightville." However that may be, the desire to know more about what is going on along this line should certainly be created.

The suggestions for newspaper publicity talks by city officials, school health leagues, public boards, and illustrated notebooks may well play a part in the activities of the class just as they do in the story.

Any wide-awake teacher will find this book a valuable guide full of helpful ideas for civic instruction. Health officers can use it to good advantage in planning demonstrations of what their departments do. Popular interest and coöperation are essential, if public health work is to be at its best.

JOHN HALL

Infants and Children: Their Feeding and Growth—*By Frederick H. Bartlett, M.D. New York: Farrar & Rinehart,* 1932. 409 pp. Price, $1.50.

This is one of the best books of the sort that I have come across. In the first place the format is good. Then it is possible to find things in it: it has an excellent table of contents and a comprehensive index. It is written in an agreeably personal style without the *ex cathedra* attitude which is so characteristic of some books written for the laity. The intelligent mother can read it without irritation. It goes into considerable detail, with enough repetition to drive home the point but without wordiness.

One of the best chapters of the book is on Habits. Some very sane advice is given there which ought to alleviate the anxiety of a certain type of parent. The emphasis laid on prevention is most commendable. In the chapter on Emergencies, however, the paragraph on Dogbite is inadequate in view of the prevalence of rabies and sentimentality in this country. In the chapter on Feeding, on pages 46 and 47, there is a slight inconsistency in the recommendation regarding the use of egg yolk. Again, the wording of the reference regarding the use of evaporated milk gives the impression of over-conservatism, perhaps.

All in all, this manual can be recommended unreservedly for the use of any mother who takes her job seriously.

MERRILL E. CHAMPION

A Study of Rural Public Health Services—*By the Sub-Committee on Rural Public Health Work and the Committee on Administrative Practice of the American Public Health Association. Allen W. Freeman, M.D., Editor. Pubished by the Commonwealth Fund of New York.* 233 pp. 84 tables. 6 ill. Price, $2.50.

This authoritative book on rural public health services in the United States and Canada is the first comprehensive review of the subject to appear in the literature of rural public health administration. It will be welcomed as a companion volume to earlier publications covering similar studies for city, state, and provincial health departments.

In the development of a tentative appraisal form for rural health organizations in 1927 the need for more accurate and basic knowledge of rural health services became apparent. The Committee on Administrative Practice of the American Public Health Association decided to undertake such a study, and a sub-committee was appointed. Financial assistance was secured through the Commonwealth Fund, and the detailed planning of the survey began in 1928. Dr. C. B. Crittenden's services were secured for personally surveying 27 typical organized and 19 unorganized counties in 28 states and 2 Canadian provinces. Furthermore, to provide a check on the representative character of the data collected for surveyed organized counties, 467 county and district whole-time health organizations were circularized with questionnaires to be filled in as for the year 1929, and

537 of those returned were analyzed. In the text the former group of counties are referred to as "surveyed counties" and the latter as "coöperating counties."

The preface to this volume is an excellent introduction to the report and will repay careful study. The first chapter is a summary of the main points of interest disclosed, and the second chapter is devoted to the background of the survey. In the thirteen chapters which follow attention is given to matters of organization, health services performed by the state, personnel, expenditures, communicable disease control, maternity hygiene, infant and preschool hygiene, school hygiene, general sanitation, and health instruction. The material for these chapters is discussed separately for the surveyed group and the coöperating group of counties.

The average area of the surveyed counties in the United States was approximately 1,100 square miles; the average population was nearly 38,500; and the average density of the population was 35 persons per square mile. More than 61 per cent of the total population of the 44 American counties surveyed was rural, and 36.4 per cent was rural farm population. Only 8 of the 44 counties had a per capita income in 1925 greater than the $750 average for the United States, and nearly one-fourth of the coöperating counties included in this study had an average per capita income of less than $200.

Only one-fourth of the surveyed counties had a separate board of health. Organized counties of the surveyed group had 1 nurse per 12,500 population. In unorganized counties there was 1 nurse per 16,000 persons, and in coöperating counties 1 nurse for 16,500 persons.

In the surveyed group the average annual expenditure for organized counties amounted to $18,748 or $.475 per capita. This was 1.5 per cent of the total cost of county government. For unorganized counties surveyed the total cost was $6,380. In the coöperating counties the average annual expenditure per county was $12,060 or $.378 per capita.

> . . . The solution of the problems of the rural health administration in the United States seems to depend upon the extension of the system of county health departments. Such county health departments must be staffed and financed more adequately than at present, and the position of county health officer must be made to offer a satisfactory career to young and well trained physicians who wish to make of health administration a life work.

The report should be of special interest and value to local rural health workers and directors of divisions of local rural health administration of state and provincial departments of health. To those actively engaged in rural health work it will contribute to breadth of vision, awaken interest in the character of information which should be collected and analyzed periodically for each unit, suggest indices for evaluating health services in terms of activities, and in general help to coördinate the separate units of the rapidly growing rural health administration movement.

Readers of this excellent report will be grateful to the American Public Health Association, the Commonwealth Fund, and to all others who have participated in its accomplishment for the high character of the services rendered.

W. A. McINTOSH

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

Seasonal Conjunctivitis—The deep South adds a new sanitary problem to the long list of its health services in the eradication of "eye-gnats" and the resulting "gnat eye disease." Adequate garbage and feces disposal combined by a simple treatment are the indicated preventive measures easier to enumerate than to apply.

BENGSTON, I. A. Seasonal Acute Conjunctivitis Occurring in the Southern States. Pub. Health Rep. 48, 31:917 (Aug. 4), 1933.

The Troublesome Typhoid Carrier Problem—Typhoid carriers of over a year's duration, in whose bile are found the bacilli, may well have the operation for the removal of the gall bladder at public expense, for it is cheaper and more effective than subsidy. In the Massachusetts series reported, stones were found in all carriers and the symptoms associated with the condition were relieved.

BIGELOW, G. H. and ANDERSON, G. W. Cure of Typhoid Carriers. J.A.M.A. 101, 5:348 (June 29), 1933.

When Thirty Days Is Too Long—Uncomplicated cases of scarlet fever may be terminated on the 21st day with but little, and on the 25th day with no more, danger to the community than on the 30th day. Complicated cases should be isolated until cleared up. Isolation for 7 days after the end of contact should be enforced.

BREST, W. H. A Study of Secondary Cases of Scarlet Fever. New York State J. Med. 33, 14:881 (July 15), 1933.

Penalties for Being Fat—Physical impairments in a group of men, including both underweights and overweights, correspond in incidence to previously established mortality rates due to the same conditions. On the underweight side we have tuberculosis outstanding, and on the overweight side are the degenerative conditions indicated by urinalysis findings and high blood pressure.

BRITTEN, R. H. Physical Impairment and Weight. Pub. Health Rep. 48, 31:926 (Aug. 4), 1933.

Getting Action in Health—Exactly what, and who, and how to tell the story of health is the burden of this discussion of health education.

BROWN, B. Mass Education. Milbank Quart. Bull. 11, 3:163 (July), 1933.

Scarlet Fever Immunity Lasts—Eight years after they were immunized, 50 formerly Dick positive children were retested. Thirty-two were still Dick negative while 18 were slightly positive.

BULL, H. G. Report on a Group of Fifty Children Dick Tested Eight Years After Immunization Against Scarlet Fever. J.A.M.A. 101, 5:363 (July 29), 1933.

Encouraging Increase in Treated Syphilis Cases—In 1927 prevalence surveys indicated that 643,000 cases of syphilis were constantly under treatment. Now it is estimated that 423,000 fresh cases are gathered in for treatment each year, and an equal number are beginning treatment for infections of long standing. An upward trend in this curve is considered encouraging.

CLARK, T. and USILTON, L. J. Trend of Cases of Syphilis Under Treatment or Observation in the United States. South. M. J. 26, 8:722 (Aug.), 1933.

Doctoring the British Tommy—A symposium of varied opinions on the proposal of a general medical service for Great Britain which now spends 200 million pounds per annum. The preventive angle is much in evidence.

COX, A. *et al.* A General Medical Service for the Nation. J. Roy. San. Inst. 54, 2:52 (Aug.), 1933.

Raw Milk and Streptococci—Another milk-borne outbreak of scarlet fever is reported. The 57 cases of scarlet fever and 38 cases of sore throat were the result of a streptococcal udder infection in a cow. The milk, of course, was not pasteurized.

FEEMSTER, R. F. and KINGSTON, J. M. A Scarlet Fever Outbreak Due to Raw Milk. New Eng. J. Med. 209, 6:275 (Aug. 10), 1933.

Vitamin A Supplements Not Needed—"In the course of an observational period of 5 months, frequent respiratory infections developed . . . among those receiving vitamin A to the same extent as among the control group. . . . There is no clinical basis for designating vitamin A the 'anti-infective vitamin.' . . . Our dietary is not deficient in vitamin A."

HESS, A. F. *et al.* Does Our Dietary Require Vitamin A Supplement? J.A.M.A. 101, 9:657 (Aug. 26), 1933.

Tuberculin Testing of Rural Youngsters—In a rural community like Cattaraugus County, the infrequency of tuberculosis in elementary grade school children makes the routine adoption of the expensive and time-consuming tuberculin test seem unwarranted. It is desirable among all high school students and contacts of diagnosed cases.

KORNS, J. H. Tuberculosis in Children. Am. Rev. Tuberc. 28, 2:251 (Aug.), 1933.

Where Public Health and Medical Practice Meet—How "ruggedly individualistic" are the present provisions for medical service? In New York State two-thirds of all hospital beds are tax supported, 15 per cent of the population receive medical care from public funds; most mental and tuberculosis, and half the venereal, cases are treated at public expense, not to mention the crippled child, the school medical services and a horde of other clinic patients.

PARRAN, T. Public Medical Care in New York State. J.A.M.A. 101, 5:342 (July 29), 1933.

Cockroaches May Spread Tuberculosis—The cockroach, a scavenger insect that inhabits our kitchens, crawling over and eating our food, should not be overlooked as a possible mechanical carrier of tuberculosis, says this author who fed the insects on tuberculous sputum and recovered the bacillus in the intestinal tract and feces.

READ, H. C. The Cockroach as a Possible Carrier of Tuberculosis. Am. Rev. Tuberc. 28, 2:267 (Aug.), 1933.

Truth in Cancer Propaganda—Urging the medical profession to assume an increasing responsibility in cancer control (to forestall more state administrative projects like that in Massachusetts), the author makes several candid statements not usually found in cancer prevention propaganda. For instance, "Probably 50 per cent of the present deaths from cancer could be prevented if treatment was undertaken in time." This is much nearer the truth than our usual "cancer is curable" sloganeering.

RECTOR, F. L. Present Day Cancer Problems. J.A.M.A. 101, 9:672 (Aug. 26), 1933.

Lungs Damaged With Silica Dust—Silicosis is discussed from several angles, symptoms, etiology and postmortem and roengenographic findings, making the symposium of especial value to the industrial hygienist.

SAYERS, R. R. The Clinical Manifestations of Silicosis. J.A.M.A. 101, 8:580 (Aug. 19), 1933.

Inherited Cancer Susceptibility—Twenty-three years' experience, involving over 116,000 mouse autopsies, leads to this conclusion: "The genetic difference between cancer susceptibility and cancer insusceptibility involves one

gene; that is, they are unit characters . . . cancer susceptibility behaves like a recessive, insusceptibility like a dominant."

SLYE, M. The Relation of Heredity to Cancer Occurrence as Shown in Strain 73. Am. J. Cancer 18, 3:535 (July), 1933.

Progress in Pediatrics—Skimming over the topics discussed at the 50 annual sessions of the Pediatric Section of the A.M.A., the author reminds us how really youthful are the modern ideas of infant hygiene. The extent of the progress in so short a time should encourage all health workers.

SCHULTZ, F. W. The First Half Century of the Section of Pediatrics. J.A.M.A. 101, 6:417 (Aug. 5), 1933.

Tuberculosis Knowledge and Programs Questioned—How far this dark view of the tuberculosis situation in England applies to the American scene is not known to this reviewer. But if half his criticism of present methods and present knowledge is true of us, we are in far too complacent a mood.

VARRIER-JONES, P. Tuberculosis: Why It Is Still a Problem. J. State Med. 41, 8:435 (August), 1933.

Breast Feeding and Future Health—Wet powder for the propagandist's guns is this conclusion: The breast-fed infant is not more resistant to disease in childhood than the artificially-fed baby, and the general health of the school child cannot be determined by the method of feeding during infancy. As one would suspect, this is British candor in all its gloomy honesty.

WILSON, J. G. Infant Feeding and Its Relation to the Health of the School Child. Pub. Health 46, 11:356 (Aug.), 1933.

BOOKS RECEIVED

THERAPEUTIC USES OF INFRA-RED RAYS. By Annandale Troup. 2d ed. London: The Actinic Press, 1933. 90 pp. Price, $2.00.

SAFETY FIRST FOR LITTLE FOLKS. By Lillian M. Waldo. New York: Scribner, 1933. 165 pp. Price, $.64.

TO BE OR NOT TO BE. A Study of Suicide. By Louis I. Dublin. New York: Harrison Smith & Robert Hass, 1933. 443 pp. Price, $3.50.

GROWING INTO MANHOOD. By Roy E. Dickerson. New York: Association Press, 1933. 100 pp. Price, $1.00.

FETAL, NEWBORN, AND MATERNAL MORBIDITY AND MORTALITY. White House Conference on Child Health and Protection. New York: Appleton-Century, 1933. 486 pp. Price, $3.00.

HOW TO STAY YOUNG. By Robert Hugh Rose. New York: Funk & Wagnalls, 1933. 195 pp. Price, $1.50.

FOOTBALL PLAYS FOR BOYS. By Ralph Henry Barbour and La Mar Sarra. New York: Appleton-Century, 1933. 110 pp. Price, $1.25.

PUBLIC HEALTH NURSING IN INDUSTRY. By Violet H. Hodgson. New York: Macmillan, 1933. 249 pp. Price, $1.75.

NERVOUS BREAKDOWN: ITS CAUSE AND CURE. By W. Beran Wolfe. New York: Farrar & Rinehart, 1933. 240 pp. Price, $2.50.

SANITARY MILK HOUSES. Plans and Construction Details. (1933 Edition.) Published by the Portland Cement Association, 33 West Grand Ave., Chicago, Ill. Free upon request.

NEWS FROM THE FIELD

WHOLE TIME HEALTH OFFICERS

ACCORDING to a directory published by the U. S. Public Health Service, in *Public Health Reports,* July 14, nearly 600 counties in the United States have health officers who devote their entire time to their official duties. In several states, groups of counties, varying from 2 to 10, are combined in districts with one health officer. Kentucky, which has 120 small counties, has 81 health officers; Alabama, with 67 counties, has 52 full-time health officers; Ohio, with 88 counties, has 44 health officers; and Tennessee, with 95 counties, has 40 health officers. In New York, only 4 counties have health service organized on a county basis, with full-time officers.

MISSOURI WATER AND SEWERAGE CONFERENCE

THE Ninth Annual Missouri Water and Sewerage Conference was held on September 22 and 23, in Jefferson City, Mo. The Missouri Public Health Association, A.P.H.A.Affiliate, met jointly with them on September 22 and 23. Among the speakers was Henry F. Vaughan, D.P.H., Commissioner of Health of Detroit, and Life Member A.P.H.A.

GORGAS MEMORIAL ESSAY CONTEST

THE Gorgas Memorial Institute of Tropical and Preventive Medicine has awarded the Maryland State prize for this year to Margaret M. Harrison, Baltimore, a student at the Roland Park Country School. The subject of the essay was "The Problem of Mosquito and Other Insect Life in Relation to Sanitation, Health and Industry."

COURSE FOR HEALTH OFFICERS

THE Albany Medical College, in coöperation with the New York State Department of Health, offers an extension course to qualify physicians for appointment as health officers of towns under 50,000 population. The course began September 1 and will continue until June.

DEATH

EDWIN W. KOPF, formerly Assistant Statistician of the Metropolitan Life Insurance Company, and F.A.P.H.A., died on August 3, at the age of 45.

PERSONALS

DR. GEORGE H. BIGELOW, F.A.P.H.A., Commissioner of Health of Massachusetts since 1925, has resigned to become Superintendent of the Massachusetts General Hospital, Boston, effective October 1. He succeeds Dr. Frederick A. Washburn, who is retiring.

DR. HENRY D. CHADWICK, tuberculosis controller of the Detroit Health Department since 1929, has been appointed Commissioner of Health of Massachusetts, to succeed Dr. Bigelow.

DR. JOHN J. PHAIR, formerly bacteriologist of the Cincinnati Department of Health, has been appointed to the staff of the International Health Division of the Rockefeller Foundation. He will be at the Research Center for Undulant Fever, Montpellier, France.

CONFERENCES

October 9–12, Sixty-second Annual Meeting of the American Public Health Association, Indianapolis, Ind.

November, Seventh American Scientific Congress, Mexico City.

November 3, Mid-year Meeting of the New York State Association of Public Health Laboratories, Albany, N. Y.

February 5–9, 1934, Third International Heating and Ventilating Exposition, Grand Central Palace, New York, N. Y.

March 29, 30, 1934, Annual Meeting of the American Association of Pathologists and Bacteriologists, Toronto, Ont., Canada.

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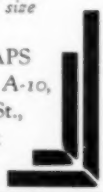

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